

Waterway and Wetland Handbook

CHAPTER 140

DAMS

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A. PURPOSE

This chapter of the Handbook will discuss permits, plan approval, transfer, alterations, abandonments and dam safety. Dams may be either large or small, new or existing or on navigable or non-navigable waterways.

The first state regulation of dams was the Milldam Act. The purpose of the Milldam Act was to encourage the construction of gristmills, sawmills, and other mills by permitting the flowing of the lands of others without acquiring flowage easements for the millpond. The mills provided a service and encouraged the settlement of the state.

A milldam is any dam which was authorized under acts of the Territorial or State Legislatures specifically referring to milldams. A substantial number of milldams have been constructed in Wisconsin, most of which are in existence (approximately 280) today. Many of these dams have been constructed across what are now considered navigable waterways. The greatest concentration of milldams is found in the east and southeastern portions of Wisconsin. Most milldams are no longer used for milling purposes.

There is great energy stored in the water behind a dam. It is because of this stored energy and the dramatic environmental changes caused when dams are constructed that regulatory programs have been enacted. Dam regulations are designed to protect the public's rights and interests in the involved resource and to protect life, health and property.

Some of the changes that can occur because of dam construction are:

1. Positive and negative effects on navigation;

2. The level and flow of the stream;
3. Water quality may degrade or improve;
4. Hazards may be created to unwary members of the public who boat, fish or hike near dams;
5. Danger may be created due to poor maintenance and operation;
6. Aesthetic changes;
7. Changes may occur in the ecology of the stream;
8. The cold water fishery resources may be diminished; and
9. Flowages may create an aquatic nuisance.

Dams provide other beneficial public uses which include: maintenance of water levels, recreational opportunities (including fishing, boating and swimming), water frontage for private and public developments, fire protection, scenic beauty, and ecological diversity. Effects, both beneficial and detrimental, must be weighed in considering dam projects.

B. HISTORY

<u>1809</u>	1st sawmill in Wis. built on Fox River, DePere	Early settlers recognized the potential of Wisconsin's many streams and rivers for transporting goods and powering lumber and grain mills.
<u>1819</u>	1st sawmill on the Black River	
<u>1831</u>	1st sawmill on the Wisconsin River	
<u>1840</u>	Milldam Act enacted by the Territorial Legislature, Wisconsin Territorial Laws of 1840, No. 48	Original adoption of the Milldam Act occurred in 1840. This enactment stated that "any person may erect and maintain a water mill, and a dam to raise water for working it, upon and across any stream that is not navigable, upon the terms and conditions, and subject to the regulations hereinafter expressed." The conditions imposed included a clause protecting against interference with existing mills and provisions for compensation of any person who suffered damage due to flowing of lands by a milldam.
<u>1841</u>	Dams on navigable streams require legislative permission, Wisconsin Territorial Laws of 1841, No. 9	To encourage economic development as well as protect the public interest in the waterways, the legislature began a program of dam regulation.
<u>1849</u>	Milldam Act repealed, Ch. 157, Rev. Stats.	The Milldam Act was repealed in 1849. The constitutionality of the milldam act had been challenged and litigation reached the Wisconsin Supreme Court in 1849.
	<u>Newcomb v. Smith</u> , 2 Pinney 131 (1849)	In <u>Newcomb v. Smith</u> , a sharply divided Supreme Court upheld the constitutionality of

the Milldam Act. The majority decided that the Act could be upheld if the lands flowed were appropriated for a purpose which promotes the public interest. The majority decision noted that water mills were a public benefit, "especially in a new country," and that numerous other states had adopted similar milldam acts which had withstood attack.

There was a lengthy and vigorous dissent filed in the case. The dissenters argued that the Milldam Act was invalid because the Legislature "neither declared in the act itself, nor ascertained in any manner that the seizure is for the 'public use'.

1854 Thien v. Voegtlander, 3 Wis 411 (1854)

The constitutionality of the Milldam Act was again sustained; private property cannot be taken for the use of the public unless compensation is made to the owner.

Pratt v. Brown, 3 Wis 532 (1854)

In 1854, another suit reached the Wisconsin Supreme Court which concerned the Milldam Act. In Pratt v. Brown, the Court dealt with an action concerning a complaint by an individual whose property continued to be flooded by a dam which had been constructed under the Milldam Act. The Court determined that the right to flow which had been granted by the Milldam Act was lost when the Milldam Act of 1840 was repealed in 1849.

1857 Milldam Act revived under Chapter 62, Laws of 1857

The Milldam Act of 1840 was "revived".

1858 Milldam Act repealed and recreated.

The Milldam Act, as a session law was repealed by Chapter 191, Revised Statutes of 1858 and recreated as Chapter 56 of the Revised Statutes of 1858.

1860 Fisher v. Horicon Iron and Mfg. Co., 10 Wis 293 (1860)

The court, in Fisher v. Horicon Iron and Mfg. Co., stated it would overrule the Milldam Act if it were not for precedent and economic benefits. Holds that Milldam Act is constitutional.

1863 Woods v. Hustis, 17 Wis 416, 417-418 (1863)

Streams, legally declared navigable, are public highways

1877 Olson v. Merrill, 42 Wis 203 (1877)

A stream that is navigable at recurring times is navigable. Establishment of the sawlog test.

<u>1897</u>	<u>Smith v. Youmans</u> , 96 Wis. 103 (1897)	Action restraining mill dam owner at outlet of Lake Beulah from taking action which would reduce level of lake. After 20 years, an artificial condition becomes a natural condition.
<u>1901</u>	Milldam Act amended	The Milldam Act was amended in 1901 to allow cities, villages and towns to build dams under the Act for municipal purposes (Chapter 229, Laws of 1901). That amendment itself was amended to indicate that the Chapter 229 amendment had no effect upon litigation pending before its enactment (Chapter 453, Laws of 1901).
<u>1908</u>	<u>Allaby v Mauston Electric Service Co.</u> , 135 Wis 345	The test of navigability under the Milldam Act is not the same as the test of navigability with reference to determining whether a stream is a public highway (waterway).
<u>1909</u>	Legislative committee formed to study State's resources	The 1909 legislature appointed a special committee to study the State's resources. The committee's report to the 1911 legislature resulted in the Water Power Acts of 1911, 1913 and 1915. These acts delegated power to state agencies to issue permits for dams and new responsibility to solve the problems associated with structures in navigable waters. One reason for the delegation of power was that the legislature had neither the time or expertise to consider the plans for each dam or to supervise their construction. This concern was heightened by the 1911 failure of the Hatfield Dam on the Black River, which destroyed most of the business district of the City of Black River Falls.
	<u>Johnson v Eimerman</u> , 140 Wis 327 (1909)	Both the 1911 and 1913 laws had some constitutionality problems. The 1915 version corrected those problems and remained essentially unchanged until the 1950s.
<u>1910</u>	Water Resources Study authorized by Legislature	Pond created by dam in now navigable creek is navigable. Rights of public in artificial condition thus created.
		The Legislature's 1910 Water Resources Study raised the concerns of dam safety and the need to protect riparian property owners' interests in flowages maintained by dams.
<u>1911</u>	Milldam Act amended (Chapter	The Milldam Act was amended in 1911 to

533 Laws of 1911)

Failure of the Hatfield Dam, Black River Falls

further restrict the construction of dams under the Act to streams "not navigable in fact for any purpose whatsoever...". Previous enactments of that act applied to streams "not navigable." The 1911 amendment was designed to exclude streams that were navigable in fact (although not navigable under previous statutes since they were not meandered) and also streams which legally had been declared navigable as public highways. Woods v. Hustis, 17 Wis. 416, 417-418 (1863).

1917 **Chapter 31** created

The Milldam Act was entirely rewritten, consolidated with the Water Power Law to form Chapter 31 and placed under the Railroad Commission's jurisdiction in 1917. The 1917 enactment created a licensure provision that is nearly identical to the current version of s. 31.33(2) (1979) (Chapter 474, Laws of 1917).

The State's treatment of dams evolved along with the definition of navigability. As the definition of navigability came to encompass more waterways, more dams and dam sites came to be regulated.

1919 Milldam Act amended

The Milldam Act was amended in 1919 to reflect the repeal of the eminent domain provisions of s. 31.14 (1917), and the placement of those provisions in Chapter 32 (Chapter 571, Laws of 1919).

1921 Milldam Act amended

The Milldam Act was amended in 1921 to reflect the Act's regulation and control provisions applicable to mills and milldams lawfully constructed or erected under the Revised Statutes of 1878, Chapter 146 (Chapter 422, Laws of 1921).

1928 Baraboo v. Railroad Commission, 195 Wis 523 (1928)

Reaffirms state regulation of dams.

1929 Flambeau R. Lumber Co. v Lake Superior District Power Co., 200 Wis 31 (1929)

The regulation of the use of navigable streams for water-power purposes does not attempt to curtail the public rights of navigation.

1930 Nekoosa-Edwards Paper Co. v Railroad Commission, 201 Wis 40 (1930)

Order of PSC denying permit for dam in Four Mile Creek. Discussed history of water law. What is "navigable water". Rights of riparians on navigable streams.

1933 Haase v Kingston Co-op Creamery

Public use of navigable artificial waters can

	<u>Association</u> , 212 Wis 585 (1933)	legally become a natural condition and the public develops interests and rights in the waterway.
<u>1936</u>	<u>Trout Brook Co. v Willow River Power Co.</u> , 221 Wis. 616 (1936)	Duty of dam owner to operate dam so upper and lower riparians are not injured. Dam need only be constructed for normal floods.
<u>1937</u>	<u>New Lisbon v Harebo</u> , 224 Wis 66 (1937) Sec. 31.06 Mellen Granite Co.	In <u>New Lisbon v Harebo</u> , the court found that the City must acquire PSC permit to construct a dam before condemnation proceedings. The PSC, in 1937, reviewed an application from the Mellen Granite Company for a permit to construct, maintain and operate a dam on the Potato River in Iron County for the purpose of generating hydroelectric energy for manufacturing steel shot. The Commission denied the application, stating that the advantages will be outweighed by the fact that "...the water falls and cataracts for about one mile of river will be forever destroyed." This is the first instance where an application was denied in the cause of aesthetics.
<u>1943</u>	<u>State ex rel. Priegel v Northern States Power Co.</u> , 242 Wis 345 (1943)	The court ruled that 25% of the natural flow must pass through a dam to protect downstream riparian owners. A dam is defined as any part of a dam; that is, the structure itself across the river, the millrace, canal, or pond.
<u>1944</u>	<u>Burkman v New Lisbon</u> , 246 Wis 547 (1944)	Prescriptive right to flow can be abandoned by non-use. Prescriptive use for milldam cannot be extended to maintenance of flowage for park.
<u>1948</u>	<u>Jones v Wisconsin Michigan Power Co.</u> , 252 Wis 280 (1948)	Defendant's right to lower water; and interpretation of dam maintenance.
<u>1949</u>	Milldam Act amended,(Chapter 125)	Broadens the Act's regulation and control provisions beyond milldams to all dams on non-navigable streams.
<u>1952</u>	<u>Muench v PSC</u> , 261 Wis 492 (1952)	The right of the citizens of the state to enjoy our navigable streams for recreational purposes, including the enjoyment of a scenic beauty, is a legal right that is entitled to all the protection which is given to financial rights."

<u>1958</u>	<u>Wis. Power and Light v PSC</u> , 5 Wis. 2d 167 (1958)	Setting of a water level is not a taking and is a proper exercise of police power. Section 31.02 applies to dams maintained before and after enactment. The provision of s. 31.34 that at least 25% of natural flow must be passed by a dam only sets a minimum, not a standard.
<u>1961</u>	Transfer and alteration permit system established	The permit system was established to resolve two problem situations. Power companies were selling dams to municipalities that often had insufficient funds and expertise to maintain them and developers were building dams to create flowages, selling lots on the flowage and later refusing responsibility for the dam. No owner of any dam may abandon, remove or alter the dam without first obtaining a permit from the department.
<u>1969</u>	DNR created	Transfers jurisdiction over dams from the PSC to the DNR.
<u>1971</u>	<u>DNR v Clintonville</u> , 53 Wis. 2d 1 (1971)	The Court ruled that the act of lowering the level of a pond without permission of DNR was not prohibited by Chapter 29. Therefore, violation of s. 31.02 does not establish cause of action for damages under s. 29.65.
<u>1973</u>	<u>Capt. Soma Boat Line, Inc. v City of Wisconsin Dells</u> , 56 Wis. 2d 838 (1973)	State has power to prohibit erection of or maintenance of any dam, bridge or other structure within or over any navigable stream which may obstruct or impede the free navigation thereof. Section 31.23 or 31.25 does not provide remedy for a private individual.
	<u>Theodore Sawle v Wisconsin Department of Natural Resources</u> , case No. 136-418	The Circuit Court of Dane County, in <u>Theodore Sawle v. Wisconsin Department of Natural Resources</u> , made a determination on May 7, 1973, regarding the validity of the Milldam Act authorization to dams which are not presently used for public purposes as defined by the Milldam Act. The Milldam Act and various court decisions have recognized that gristmills, sawmills, or other mills are public businesses, and that the state may exercise its sovereign power of eminent domain through the agency of the mill owner in acquiring the flowage rights for use of the public mill. The generation of electric energy and the distribution of such energy for light, heat, and power purposes is also a public purpose under the terms of the Milldam Act. The <u>Sawle</u> decision states that a

dam which was originally authorized by one of the several Milldam Acts and which is abandoned (drawn down) and no longer used for the purposes enumerated above is no longer authorized by the Milldam Act and must receive further approval from the department under Chapter 31. Dams built prior to the Water Power Act of 1911 which were not authorized under the Milldam Acts require authorization under Chapter 31, if the present or previous owners of the dam did not obtain prescriptive rights to flow the lands of others prior to 1911 or if it can be documented that the original use under which prescriptive rights were obtained has been discontinued subsequent to 1911 for a period greater than 10 years. Prescriptive rights may have been secured for another purpose however, if the flowage was maintained for twenty years since 1911 and no legal action has taken place to sue for damages.

Substantive evidence in the record to support DNR's issuance of dam permit.

Daly v Natural Resources Board,
60 Wis 2d 208, Certiorari denied
94 S. St. 883, 414 U.S. 1137, 38 L.
Ed. 2d 763 (1973)

1975 DeGayner & Co., Inc. v Department of Natural Resources, 70 Wis
2d 936, 236 N.W. 2d 217 (1975)

A stream is navigable if it is navigable in fact at recurring times each year long enough to make the stream useful as a highway. Existence of beaver dams on a stream for 37 years is a natural condition.

The Natural Resources Board adopted a policy on milldams in 1976 after the Dane County Circuit Court decision in Sawle v. DNR (1973).

The policy stated that Chapter 31, be applied to all milldams which are no longer legally authorized under the Milldam Act. It also stated that in determining whether authorization is to be granted to the owner of the milldam, the department shall use the standards of 31.06(3). This board policy has since been rescinded.

Although the Sawle decision made very clear policy for dams where the pond levels have not been maintained for a period of time greater

than 10 years, Department staff have had great difficulty in dealing with milldams and s. 31.33.

The problems arise with milldams that have stopped milling many years ago, but still maintain a pond. The workload to have all the existing dams reauthorized would be staggering; therefore, we have not normally requested reauthorization. Many of these dams have had PSC and DNR decisions relating to transfers, levels, repairs, etc., where there was no mention or question of authority for the dam. These decisions would tend to support a "color of authority" for these dams.

<u>1979</u>	NR 330 created	NR 330, Warning Signs and Portages for Dams, was created as an emergency rule.
<u>1981</u>	31.185 amended, 710.11 created	A person may not accept the transfer of the ownership of a specific piece of land on which a dam is physically located unless the person complies with s. 31.14(4).
<u>1985</u>	NR 333 created	Established criteria for design, construction and reconstruction of dams to minimize danger to life, health and property, pursuant to ss. 31.02(2), 31.19 and 31.33.
<u>1987</u>	NR 335 created	Created originally to establish a fee system pursuant to s. 31.20 for inspections of dams and reservoirs conducted by the department under s. 31.19.
<u>1989</u>	<u>Tenpas v. DNR</u> , 148 Wis. 2d 579, 436 NW (2d) 297 (1989)	The court found that "s. 31.14(4) provides the DNR with regulatory power over dams generally, with the exception of cranberry dams...Although public safety is a concern of the state, the DNR presents no authority suggesting that the legislature has delegated to the DNR the power to regulate safety hazards created by cranberry dams." The court also held that "the specific legislative treatment of cranberry growers under s. 94.26, precludes application of the general financial responsibility requirements of ss. 710.11 and 31.14(4), to cranberry dams."
<u>1990</u>	NR 335 recreated	NR 335 was repealed and recreated to establish procedures for implementation of the dam maintenance, repair, modification, or abandonment and removal aid program. Fee system repealed.

C. MECHANISMS

1. NEW DAMS ON NAVIGABLE STREAMS.

Section 31.05 provides for permitting of new dams on navigable streams. Section 31.04 allows the permit to be granted to a corporation, a municipality or a private individual. Section 31.02 (water levels, flow, benchmarks and appurtenances), and s. 31.34 (low flow requirements) must be considered. Proposed dams on navigable streams require a public notice and the opportunity for a public hearing under s. 31.06. Section 31.14 requires financial responsibility be demonstrated. Once a permit is secured, s. 31.12 requires dam plan approval. Section 31.18 requires that trees and brush be removed prior to flowing the land.

2. NEW DAMS ON NON-NAVIGABLE STREAMS.

No permit is needed to construct a dam on non-navigable waters. However, s. 31.33 references s. 31.12 requiring only plan approval for dams on non-navigable streams. In the plan review, s. 31.02 (water levels, flow, benchmarks and appurtenances) must be considered. A s. 30.19 permit may be required if the dam is within 500 feet of a navigable stream. A ch. 30.20 (dredging) permit may be required if there will be materials removed from the creek channel.

3. AUTHORIZING DAMS BUILT PRIOR TO 1915.

Sections 31.07 and 31.08 have been set up to authorize dams built before passage of the 1915 Water Power Act but not authorized under the Mill Dam Acts. This procedure applies to pre-1915 dams on navigable streams as well as streams which were considered non-navigable at that time. These sections provide for an application and hearing process.

4. REGULATION OF EXISTING DAMS.

a. Water Levels and Flow

Section 31.02 gives the Department the authority to regulate the water levels and flows. The Department may require benchmarks to reference the water levels and flows.

Section 31.34 provides for minimum flows from a dam. Dams must pass at all times at least 25% of the natural low flow which has been administratively set as $Q_{7,10}$. This does not apply to dams that discharge into a lake or flowage or where the department has determined that the minimum discharge is not necessary to protect fish life. This section also provides a fine for the violation of the minimum flow requirements.

b. Appurtenances

Section 31.02 authorizes the department to require appurtenances including locks, fishways, flood gates, and booms to protect the public interests.

c. Transfer

Section 31.14 requires dam transfer permit applicants to demonstrate financial responsibility to ensure dam construction, maintenance and repair for a minimum of 10 years. A municipally-owned dam may not be transferred to a private individual or foreign corporation according to s. 31.21. Section

31.185 states that no person may transfer ownership of a dam or the ownership of the piece of land on which a dam is located without first obtaining a permit. Section 710.11 of the real estate laws requires that the transfer of any parcel of land containing a dam (large or small, on navigable or non-navigable) must follow s. 31.14. Section 31.38 provides a mechanism for financing municipal dams.

d. Alterations including Raising, Enlarging and Adding Hydropower

Section 31.13 sets up a permit procedure allowing dam owners to raise and enlarge their existing dams. This process is intended to protect both public and private rights in the present impoundment and follows the same permitting procedures as new dams.

Section 31.18(1) requires owners to maintain their dams in a state of good repair. This paragraph also requires that an owner seek approval of the Department prior to willfully destroying or removing any part of their dam and allows the Department to issue emergency repair orders without notice or hearing.

Section 31.18(3) forbids substantial alterations or additions unless those alterations are ordered by the Department.

e. Abandonment

Section 31.18 provides abandonment procedures for dams authorized by s. 31.33, Mill Dam Act and Legislative grants.

Section 31.185 requires a permit to abandon a dam initially authorized under s. 31.06 or 31.08. This includes a public notice and hearing if necessary. A 120 day waiting period is provided if there is an objection to the abandonment.

Section 31.187 provides the Department with authority to remove dams that have been abandoned. Prior to the Department removing the dam, s. 31.253 requires a public notice and/or informational hearing unless it is an emergency.

f. Dam Safety Inspections

Section 31.02 allows department staff free access to dams, lakes and streams for investigation. Under s. 31.19, the Department may inspect any dam but is required to inspect all large dams on navigable streams, with the exception of federally inspected dams, at least every 10 years.

Insufficiencies found during an inspection can be remedied through orders pursuant to ss. 31.19(5), 31.02, 31.18, and 31.185.

g. Milldams and Dams on Nonnavigable Streams

Section 31.33 establishes the jurisdiction of the department in addressing mills and milldams. As with other dams, this section cites ss. 31.02 (levels and flows), 31.12 (plan approvals), 31.18 (operate and maintain), 31.19 (inspection), 31.25 (public nuisances), and 31.26 (civil liabilities) as applicable regulatory statutes.

h. Cranberry Dams

Section 94.26 exempts cranberry dams from the regulations in Chapters 30 and 31. This was confirmed in the Supreme Court Decision *Tenpas v. DNR* which upheld the ruling that s. 31.14 did not

apply to dams used in cranberry production. (Also see Handbook Chapter 180)

i. FERC-Regulated Dams

To determine the Department's authority on Federal Energy Regulatory Commission (FERC) regulated dams, the articles of the license must be reviewed. FERC generally supersedes Chapter 31. In some cases, FERC provided for DNR involvement in the license articles. Dams receiving a FERC exemption are considered to be under department jurisdiction.

j. Grants

Section 31.385 set up the dam maintenance, repair, modification, abandonment and removal grant program. The program provides 50 - 50 cost-sharing, up to \$200,000, to municipalities and public inland lake protection and rehabilitation districts for dam repair or removal. In 1989 the legislature provided \$2.5 million in funding, and in 1991, an additional \$3 million was added to the program.

k. Fees

Section 31.39 provides a fee schedule for the department to charge to carry out permit and approval duties.

l. Enforcement

Section 30.03(2) provides for enforcement proceedings through the local district attorney's office and local courts.

Section 30.03(4) provides for the Department to hold a hearing and issue an order to direct responsible parties to refrain from performing acts which would be an infringement of public rights.

Under s. 30.15(1)(b) it is unlawful to place in navigable waters "any substance that may float into and obstruct any such waters or impede their free navigation." Section 30.15(2) would appear to provide an exception for "the floating or movement of logs or timber in navigable water". However, that exception dates back to the early history of our state when navigable streams were used for driving logs to mills and should not be stretched to immunize the passing of potentially hazardous semi-floating logs by dam owners.

Under s. 31.02(2) the operation of dams in navigable waters is subject to the supervision and to the orders and regulations of the Department made or promulgated under Chapter 31. The Department may investigate and determine reasonable methods of operation to protect public rights in navigable waters and to protect life, health, and property.

Under s. 31.18(4) the Department may order the grantee of any permit under Chapter 31 to remove fallen timber.

Section 31.23 provides forfeitures for dams of \$50/day for violations and up to \$1000 for violation of an issued order. Dams in violation of Chapter 31 are declared public nuisances and may be abated under s. 31.25.

Section 31.26 states that dam owners are subject to civil liabilities for damages caused by the dams.

D. STANDARDS

1. **ABANDONMENT.** Dam removal standards can be found in s. 31.18 for dams authorized by s. 31.33, the Mill Dam Acts and legislative grants and s. 31.185 for dams authorized under sections 31.06 and 31.08. Although s. 31.18 requires approval and s. 31.185 requires a permit, the statutory standards are almost identical.

Our general policy requires the removal of all structures regardless of whether they were originally below the OHWM. The Department may allow a portion of the structure to remain if the owner can demonstrate that it will not be hazardous.

- a. Our specific statutory standards to consider are:

- 1) Protection/preservation of public rights in navigable waters. The public has a right to wade, swim, fish, boat, enjoy scenic beauty, and all other incidents of navigation.

These rights are commonly associated with the normal use of the river during normal stream flow. Protection of these rights require, at a minimum, removal of all structures below the natural OHWM (e.g. before the dam was in place).

- 2) Promote safety (only in s. 31.185)

As many hazardous or attractive nuisances as possible should be eliminated from any remaining structures. If a structure cannot be made safe it should be removed regardless of impact to flood flows or its relationship to the river. Excessively steep slopes should either be flattened or fenced and signed. The profile of the stream bed should also be considered and it's danger to waders or fisherman assessed.

- 3) Protection/preservation of life, health and property

Some of the same kinds of concerns listed in item b should be considered under this standard. In addition, the effect any remaining structures will have on flood flows and the potential for downstream damage from failure during such flood flows must be assessed. If an owner wishes to retain portions of the structure, above the OHWM, (s)he must show:

- a) That the structure will cause no more than two feet of backwater during the regional flood.
- b) That the remaining structure will be stable during the regional flood.
- c) That rights to flow areas inundated by the structure during the regional flood have been retained or acquired.

- b. Generally the applicant should be required to provide any technical hydrologic/hydraulic analysis. For very small removal projects (under \$125,000) the Department may provide technical help. Analyses should include the following:

- 1) An estimate of the 100 year flood in accordance with the standards of NR 116.07(3).

- 2) A profile of the regional flood with the dam in place considering the routing effects of the dam.
- 3) A profile of the regional flood, both upstream and downstream, without the dam in place.
- 4) A comparison of the above two profiles to the point of convergence downstream.
- 5) A delineation of the 100 year flood with the dam removed covering the area of convergence shown in item d above.

Downstream easements for additional flooding caused by dam removal are not required before we allow abandonment. To do so would require the owner to perpetually maintain a benefit to downstream properties.

- c. A sediment control plan consisting of an explanation of what's there and how the owner intends to stabilize the bed after removal should be required. This plan should include the following items:
 - 1) Existing bed contours.
 - 2) Grading proposals.
 - 3) Seeding plan.
 - 4) Necessary riprap
 - 5) Drawdown procedure.

Sediment sampling may be required. The number of samples and chemicals tested should be case specific (consult with district dredging coordinator). In some cases where we have no real indication that the sediment could have been contaminated we may require no testing. Refer to NR 347 for specifics.

2. ALTERATIONS.

Section 31.185 establishes the permit and notice procedure. The procedures of s. 31.18 which does not require a notice procedure should generally be used for alterations which are not likely to impact the riparian rights of landowners on the impoundment. Section 31.13 provides a procedure to permit the raising or enlarging of a dam. Section 31.21 requires the department to approve leases longer than 10 years for hydroelectric generation.

The Department may issue orders approving alterations under s. 31.18, or order alterations, additions or repairs under s. 31.19.

Section 31.185 does not apply to dams authorized under s. 31.33.

3. ARTIFICIAL FARM DRAINAGE DITCHES.

Section 30.10 was changed on May 7, 1982, to say that farm drainage ditches which are non-navigable streams prior to ditching were declared to be not navigable. Prior to this change, if a farm drainage ditch could be navigated it was considered to be a navigable stream.

This change raises several issues that need to be addressed for the following fact situation: Several permits under s. 31.05 were issued to construct dams on a farm drainage ditch, which was a navigable stream, prior to the law change. Subsequent to the statutory change, several dam plan approvals pursuant to s. 31.33 were issued on the same "stream" (now a nonnavigable farm drainage ditch), in the same vicinity, and in some cases, to the holders of previous dam permits. The permits and plan approvals contained a condition that any future transfer of ownership must comply with the requirements of s. 31.185. The "stream" has no history of public use. The flowages created by the dams are entirely on privately owned parcels of land which have no public access.

The issues to be addressed are:

- a. The "stream" on which some of the dams were permitted is now considered nonnavigable. The flowages are now nonnavigable private waters since the legislature affirmatively removed this class of "stream" from classification as navigable waterways.
- b. It was correct to issue plan approvals for dams built after the 1982 legislation even though they were constructed across parts of the originally permitted navigable flowages. At the time these approvals were issued, the flowages were considered to be nonnavigable and private due to the change in the law.
- c. The conditions of the original permits and later plan approvals should be revised to eliminate the requirement to comply with s. 31.185. Only those statutory sections directly referenced in s. 31.33 apply to plan approvals issued under that section (except, of course, s. 710.11 and its redirection to s. 31.14). In the case where permits were issued, the proper course of action would be to rescind the permits and reissue plan approvals pursuant to s. 31.33 and eliminate the requirement to comply with s. 31.185. This might seem like an unnecessary action, but given the legislative intent to limit jurisdiction for such "streams" and the current fact situation, the permit really unlawfully restricts the landowner's rights. Any activity to change ownership prior to making these permit and approval changes should only be regulated by s. 710.11.

4. BOATING SAFETY.

NR 330 requires dam owners to place certain types of signs and devices to warn of dams and to provide and identify portages around dams. NR 330 also requires the Department to inspect dams and issue orders for signs and other devices to warn boaters of danger around dams, as well as portage facilities where appropriate.

5. COMPLETION DEADLINES.

Section 31.11 allows 5 years plus a 2 year extension for good cause to construct dams on navigable streams. While appropriate for large dams on navigable streams, this period of 7 years is not appropriate for the typical small dam on a nonnavigable stream authorized by plan approval. A 3 year period should be sufficient to allow for construction of a small dam.

If an approved dam was not constructed within the established time period, the districts should write the owner a letter stating that the approval has expired. The bureau should receive a copy of the letter so that an appropriate adjustment to the authority index and dam inventory can be made. An extension of the authority for a period not to exceed 3 years may be approved if the request is received before the expiration of the original approval.

6. DAM FAILURE ANALYSIS.

NR 333.05 (2)(b) requires the submittal of a dam break analysis. All new dam break profiles should be based upon failure of the dam during the 100 year flood. Failure should be assumed to occur at the maximum pool possible during the regional flood or upon overtopping of the dam. A technical description of the assumptions used to develop a dam break profile should be included.

Study standards for dam break analyses are an item of great concern for our technical staff. These standards are likely to change and expand as program staff acquire more background knowledge. However, for the immediate future we will apply the following general study standards:

	<u>Urban Areas</u>	<u>Rural Areas</u>
Minimum X-Section Spacing	1000 ft	1-2 miles
Accuracy of X-Section	$\pm .1$ ft	Taken from 7.5 min. quadrangle
Acceptable Methodology	DAMBRK, HEC1/HEC2	DAMBRK, HEC1/HEC2 Simplified DAMBRK
Limits of Dam Break Profile*	Entire community to within 0.0' of the regional flood within the limits of the community; to within 1.0' of the regional flood computed without the dam in place outside of the community limits.	To within 1.0' of the regional computed without the dam in place.

*The delineation of the dam break profile may stop within 1.0' of the regional flood but the analysis should extend downstream in order to take in the effects of downstream control sections such as bridges, dams or other river systems. If there is an existing Flood Insurance Study in-place, then the delineation of the dam break profile should continue at least as far as the study limits or until the profile merges with the 100-year profile.

The recommended discharge to be used flowing into the reservoir should generally be Q_{100} assuming all upstream dams are functioning as designed. However, in some cases, it may be more appropriate to consider all upstream dams to have been removed. The value of Q_{100} used to delineate the regional flood profile with the dam nonexistent should be the same as the peak reservoir inflow with no attenuation included for reservoir storage.

The minimum documentation required in a Dam Failure Analysis Report is as follows:

- a. A narrative, including:
 - 1) A statement of the purpose for which the analysis was performed.
 - 2) A summary of discharge values and flood elevations at distinctive geographic points.
 - 3) Specification of the version and program used.

- 4) Type of Dambreak "option" used in the analysis.
- b. A hydrologic study, including:
- 1) A detailed description of the methodology and parameters used to obtain the inflow hydrograph.
 - 2) A plotted inflow hydrograph.
 - 3) A listing of the peak discharges used in the dam failure analyses which must be formulated consistent with the acceptable standards for peak discharge determinations found in Wis. Admin. Code NR116.07(3). A minimum of two independent methods of calculating the 100 year peak discharge must be used. In cases where a local community has adopted a Flood Insurance Study (FIS) or floodplain study into a local floodplain zoning ordinance, the peak 100 year inflow from the flood study must be used in the dam failure analysis unless the 100 year flood discharge and the entire FIS are revised.
 - 4) Hydrograph plots at the downstream face of each dam (model plots are acceptable).
- c. A hydraulic study, including:
- 1) A description and a cross sectional plot of the dam. The cross section should be as viewed from downstream and must include all pertinent elevations (sill, top of gates, spillway, embankment, etc.) and the assumed breach geometry. Describe assumptions used regarding dam operations (i.e. gates open, stoplogs removed, flashboards failed, etc.).
 - 2) Any rating curves (elevation vs. discharge) used for the gates, spillways, etc.
 - 3) Stage/storage curves or tables for the reservoir(s) when level pool routing is used.
 - 4) Breach parameters and justification for their use. A statement describing the results of a sensitivity analysis of the breach parameters must be included.
 - 5) Any problems encountered in the modeling as well as a list of the techniques used to resolve them.
 - 6) Plots of all input cross-sections used in the Dam failure analyses (surveyed left to right looking downstream). Plot the surveyed cross sections overlaid with the Dambreak cross section approximations used as input into the model. Specify the section locations and how they were determined. If x-sections are translated from a FIS, a table should be included to equate the x-section identifiers for each study.
 - 7) Plots of bridge openings (both actual and input data). When applicable, option 12 of the NWS DBRK model, version 1988 should be used to model bridges.
 - 8) All documentation to justify Manning's "n" values used in the analysis (photographs, method used to obtain composite "n" values, etc.).
 - 9) For each run, a) 100 year failure of the dam; b) 100 year with the dam in place; and, c) 100 year without the dam, the following information will be required for Department review:

- i) Two (2) copies of maps for each of the dam failure conditions above. Each map must contain a title and date, map key, map scale, north arrow, hydraulic shadow, floodway/floodfringe/storage areas, cross-sections labeled, and enough contour information to verify the floodplain limits. Each map must be adequate for administration in local floodplain zoning regulations.
 - ii) Two (2) plotted hydraulic profiles with pertinent cross sections and bridges labeled, and stream inverts.
 - iii) Two (2) separate floodway data tables (the data table must include the cross section identifier (number or letter), distance description (feet or miles), floodway top width, water surface elevations, and peak discharges).
 - iv) Hydrograph plots at the downstream face of each dam (model plots are acceptable).
- d. Appendices and follow up information, including:
 - 1) A 3 1/2 inch diskette which includes all input/output including hydrologic models and dam failure analyses (for NWS DAMBRK, JNK =9 output is required on disk). This diskette must also include an index file which identifies each file.
 - 2) Dam failure output in hardcopy format. When using the NWS DAMBRK model an output control parameter of 5 is typically recommended. The hardcopy must also include reservoir depletion tables (if used) and flood crest summary information.
 - 3) Structure identification and inventory (with first floor elevations) downstream of the dam adequate to determine its hazard rating and for preparation of an emergency action plan (EAP). Include a statement as to the dam's proposed preliminary hazard rating based on this information and the criteria outlined in NR333.
 - 4) Copies of survey information (field notes) used. Descriptions and locations of benchmarks used should be included on the map. Elevations used in the analysis must be to USGS (NGVD) datum.
 - 5) Copies of pertinent coordination letters with DNR, community officials, other agencies, etc.
 - 6) Upon approval of the dam failure analysis by the Department, one additional copy of the study documentation and a total of 3 copies of each map/profile/floodway data table **plus** 2 additional copies for each community impacted by the failure analysis must be submitted to the Department. Colored maps are not acceptable since they can not be easily reproduced.
 - 7) Copies of the registered letters sent to all communities effected by the dam failure analysis.

7. DEBRIS REMOVAL AT DAMS.

Requiring dam owners to remove floating logs or other debris rather than passing the material downstream can be addressed under ss. 30.03(2), 30.03(4), 30.15(1)(b), 31.02(2) or 31.18(4). Generally, if dam owners touch the logs or debris, they must remove it.

8. DESIGN OF DAMS.

Included in NR 333 are informational items for hydraulics, hydrology, stability analyses, dam hazard ratings (based on existing land use and land use controls), spillway capacities, and operation, inspection, maintenance and emergency action plans. Further detailed discussion of these items is provided under other subsections of this chapter. Plan submittal requirements are listed in NR 333.05.

Large dams are defined as those with either structural height greater than six feet and maximum storage capacity of at least 50 acre feet, or structural height greater than 25' and maximum storage capacity of at least 15 acre feet. The design of these dams must be signed and their construction supervised by a professional engineer registered in Wisconsin.

9. EASEMENTS.

Chapter 31 permits and plan approvals require flowage easements for the upstream area. The applicant for a new or modified dam must obtain easements or appropriate legal arrangements prior to construction from all property owners affected by increases in flowage and flood elevations up to the 100-year flood elevation with the dam in place. Local floodplain zoning ordinances require that map amendments be obtained when a change in profile occurs and zoning is in effect for the stream in question.

a. The mechanism for ensuring compliance with these requirements should be the provisions of the permit or plan approval. Permit conditions and actions are:

- 1) Privately owned dams. Section 31.05 requires that private applicants acquire at least 65% of the land to be flowed prior to submitting an application to construct a dam. The permit process may be streamlined by requiring that remaining easements be obtained as a condition of the permit, but must be completed before construction commences. Private owners should obtain easements for lands covered by both the normal pond and 100-year flood.
- 2) Publicly owned dams. In this case, title to the affected lands could be obtained by condemnation, if absolutely necessary. If the dam is owned by a public body, the easements for the pond and the easements for any increased flood elevations caused by the dam should be a requirement of the permit. Such easement must be in place or condemnation proceedings must be commenced prior to construction.

Responsibility for maintenance and proper operation of the gates rests solely with the dam owner. However, there are numerous examples of dams where the gates have not been operated in years and would require extraordinary effort to get the gates into an operable condition. There are also numerous examples of dams which have failed where the gates were routinely operated, were in good condition, but failed to operate during a flood due to debris or ice.

Unless the owner can demonstrate conclusively that the gates will operate, our standard policy for evaluating the 100-year flood elevation for regulatory purposes should be based on the premise that all gates are closed.

b. Criteria for adequate gate operation should be documentation of all of the following:

- 1) Gates are presently in working order.
- 2) There is no history of difficulties in operating the gates during flooding events.

- 3) An adequate operation plan for flooding events is written and implemented which assures operation of the gates 24 hours a day.

10. EMERGENCY ACTION PLANS.

Emergency Action Plans (EAP) are a requirement of NR 333.07(4)(c). An EAP is a document prepared for a specific dam, describing the actions taken to prevent loss of life and minimize property damage in the event of a dam failure. The EAP should include all instructions for a dam operator to follow during an emergency, written in a clear and precise manner.

During its development or upon completion, each EAP should be discussed with local community leaders or the people directly responsible for the well-being of the local residents. Federal and state agencies affected by an emergency should also be contacted. NR 333 requires an EAP to be prepared in consultation with the local unit of government and with concurrence by the Division of Emergency Government (DEG).

Documentation of this consultation should be submitted prior to unconditional approval of an EAP. If such consultation has not yet occurred, an approval letter from the Department may be issued conditioned upon completion of the consultation. Since DEG's standard operating procedure includes consultation with the local unit of government, an approval memorandum from the DEG area office will sufficiently document consultation.

Local officials should be clearly aware of the hazard potential a dam failure would present and each plan should include warning system and communication procedures to warn downstream residents. Each plan should also include inundation maps, as determined by a dam failure analysis.

The EAP should include a purpose statement, a description of the dam, a list of the name(s) of the person or organization responsible for the operation and maintenance of the dam, a schedule for updating and testing the plan, and a map of the hazard area (the delineation of the hydraulic shadow). Particular attention should be paid to emergency actions which can be performed despite loss of electrical power and telephone service.

The format and other informational requirements of the EAP should be consistent with the February 1985 Federal Emergency Management Agency (FEMA) Publication, "Emergency Action Planning Guidelines for Dams." See attachment #3 for a suggested outline for emergency action plans taken from the FEMA publication.

EAPs, in general, require profiles for the hydraulic shadow (the dam failure floodplain), the regional flood (usually the 100 year floodplain) and the dam non-existent conditions. In rural areas, the profiles of the hydraulic shadow and the regional flood with the dam non-existent should converge to within 1.0 foot. In urban areas, the profile of the hydraulic shadow and the regional flood profile should converge to within 0.00 feet within the community limits. If the two profiles do not converge within the community limits, the rural criteria govern.

In cases where a flood insurance study exists downstream of a dam and the flood insurance study was based on the dam in-place condition, the hydraulic shadow should continue at least as far as the study limits or until the profile merges with the 100 year profile computed with the dam in place.

For dams in series an EAP for the entire watershed will be developed by the independent development of EAPs for all unsafe dams (under capacity or physically impaired) and all safe High Hazard dams.

Therefore, in developing an EAP for a specific dam, a dam break analysis for that dam would not need to include an analysis of failure of dams upstream but should include analysis of the impacts the failure of the dam in question would have on dams downstream.

Although we will not analyze upstream dam breaks, the EAP should speak to the status of upstream dams. Can the upstream dam reduce stress on the failing dam or reduce impending flood waves by storing water?

While a dam failure analysis may need a distinction between floodways and flood fringe areas to comply with the informational requirements of NR 333.05(2) for construction of a new dam or reconstruction of an existing dam, it is not necessary that it be included in an EAP to satisfy the safety measures of NR 333.07(4).

Hard copies of input and output data of analyses used to develop an EAP may be enough to determine its adequacy. However, before final approval is issued for the EAP, a copy of the electronic deck must be submitted.

11. ENVIRONMENTAL ANALYSIS.

NR 150 establishes procedures for determining what degree of environmental review and public notification is given to a particular project. Details on the specific actions required are discussed in the following "Process" section.

12. FEDERAL ENERGY REGULATORY COMMISSION (FERC) PROJECTS.

NR 333.02(3) exempts dams licensed under 18 CFR Part 12 provided the dam meets requirements which are at least as restrictive as the requirements of NR 333. These dams are essentially large hydroelectric dams and reservoirs regulated by the FERC.

- a. In order to show compliance with minimum standards, an owner must provide the department with the following:
 - 1) An acceptable emergency action plan (EAP)
 - 2) An acceptable plan of operation and maintenance
 - 3) Routine copies of their consultant's inspection report.
 - 4) Evidence that the dam has sufficient hydraulic capacity for its classification and evidence that appropriate land use controls are in effect for a lesser capacity.
- b. In most cases it will not be difficult for an owner to demonstrate the dam meets the minimum requirements. However, there are a few items which we should advise owners of in order to avoid inadequate EAPs and stability analyses. They are as follows:
 - 1) FERC projects require EAPs. Unfortunately these EAPs may not require consideration of the requirements found within NR 333. In most cases FERC EAPs will be more restrictive than NR 333's required EAPs. However, it is possible to satisfy FERC EAP requirements without meeting the requirements of NR 333. In order to avoid this situation we should apprise dam owners of the requirements of NR 333 during the preliminary permit process and during review of EAPs.

- 2) FERC safety inspections require stability analyses during the independent consultant's five year inspection. These analyses generally consider a normal pool condition. We should advise the owner that they should also include a design pool analysis as required by NR 333.

Complete compliance with NR 333 should be requested at the time of relicensing of FERC projects. Since relicensing is the only other major opportunity the Department has to comment on FERC projects besides initial license or exemption applications, complete compliance with NR 333 should be addressed at that time. In order to determine if a FERC project complies with the requirements of NR 333, the information identified under NR 333.05 and .07(4) should be reviewed.

During the first stage consultation process (initial department contact), we should advise applicants that they should include evidence at the end of the stage two consultation (draft application submittal) which demonstrates that they have complied with the substantive requirements of NR 333 and include a provision within the draft application which specifies that the department will receive a copy of all inspection reports.

During the third stage consultation period (final application) we should verify that NR 333 has been complied with or that the applicant has adequately justified their reasons for non-compliance.

Chapter 30 is applicable to all structures and water related projects not affiliated with the structural components of the dam. Our comments at the third stage should request that the license issued by the FERC recognizes the Department's continuing jurisdiction under this chapter.

Chapter 31 essentially defines the Department's regulatory authority on all dams. FERC regulations supersede the requirements of Chapter 31 but we should try to retain as much of our regulatory authority as possible by requesting that FERC recognize our concurrent jurisdiction/interest within the license. We should take a more aggressive stand in those projects where an exemption from FERC regulations is being pursued. If an exemption is being sought we should inform them that all procedural and substantive portions of Chapter 31 remain in full effect.

If not related to an initial license or exemption application or a relicensing action, review of an EAP for FERC projects will not require full compliance with the other requirements of NR 333. The EAP review letter should, however, inform the owner that the Department will request full compliance of all NR 333 requirements at the time of relicensing.

If a determination is made that a FERC project does not meet the requirements of NR 333, the owner should be informed of the loss of exemption status and the reasons why.

- c. The owner should also be informed that loss of exemption status will mean that additional information or action will be needed at such time one of the following actions occur:
 - 1) The dam is proposed to be reconstructed.
 - 2) The dam is ordered to be reconstructed.
 - 3) A floodplain zoning ordinance adopted and approved pursuant to s. 87.30 becomes effective for the area downstream from the dam which is required to be regulated under NR 116.

13. FINANCIAL CAPABILITY.

Sections 31.14(2) & (3) require that applicants for permits to build new dams demonstrate a minimum level of financial capability to operate and maintain for a minimum of ten (10) years. Specific procedures have been developed considering ownership/operation arrangements, on how to determine the amount of financial responsibility and on acceptable ways of proving financial capability (see attachment #1). Section 31.14 also requires that the party to which a dam is being transferred demonstrate sufficient financial capability to maintain the dam and to cover the cost of future repairs.

14. GRANTS.

Section 31.385 and NR 335 establish procedures for implementation of a dam maintenance, repair, modification, or abandonment and removal aid program for dams owned by a municipality or public inland lake protection and rehabilitation district. State financial assistance is limited to no more than 50% of the project costs and a maximum of \$200,000 per project.

15. HYDRAULIC CAPACITY.

For determining the adequacy of an existing dam's spillway capacity and the associated corrective action needed the following chart was developed on the same risk potential rationale of a new dam being overtopped during its design life as shown in Table III of NR 333 and is based on an assumed design life of 50 years for all dams. Corrective action should be taken at such time that the risk of overtopping before corrective action is taken exceeds the risk of overtopping of a new dam during its design life. The chart indicates when corrective action should be taken in the form of an immediate drawdown or issuance of orders to upgrade the spillway capacity.

This chart should only be used for dams that are structurally adequate and have not had a preliminary hazard rating determined. Dams that require reconstruction or have had a preliminary hazard rating determined must be upgraded to the required spillway capacity of NR 333 within 10 years unless ordered to do so earlier. Prior to an immediate drawdown appropriate parties (i.e., sheriff, local fish manager, etc.) should be consulted to minimize the potential impacts to the resource or downstream property owners.

While this chart provides a consistent basis for determining when a drawdown or repairs may be in order, it is not a substitute for professional judgment. If there are questions about the appropriateness of these guidelines in a given situation, an engineer should be consulted.

<u>Preliminary Hazard Rating</u>	<u>NR 333 Minimum Capacity</u>	<u>Existing Capacity</u>	<u>Corrective Action</u>
1A	Q ₅₀	< Q ₁	Immediate Drawdown
		Q ₁ -Q ₂	Upgrade in 2 years
		Q ₂ -Q ₅	Upgrade in 5 years
		Q ₅ -Q ₁₀	Upgrade in 10 years
		> Q ₁₀	OK until next inspection

<u>Preliminary Hazard Rating</u>	NR 333 <u>Minimum Capacity</u>	<u>Existing Capacity</u>	<u>Corrective Action</u>
1B Minor	Q ₁₀₀	< Q ₂ Q ₂ -Q ₅ Q ₅ -Q ₁₀ Q ₁₀ -Q ₂₅ > Q ₂₅	Immediate Drawdown Upgrade in 2 years Upgrade in 5 years Upgrade in 10 years OK until next inspection
IB Major and II Minor	Q ₂₀₀	< Q ₅ Q ₅ -Q ₁₀ Q ₁₀ -Q ₂₅ Q ₂₅ -Q ₅₀ > Q ₅₀	Immediate Drawdown Upgrade in 2 years Upgrade in 5 years Upgrade in 10 years OK until next inspection
II Major and III Minor	Q ₅₀₀	< Q ₁₀ Q ₁₀ -Q ₂₅ Q ₂₅ -Q ₅₀ Q ₅₀ -Q ₁₀₀ > Q ₁₀₀	Immediate drawdown Upgrade in 2 years Upgrade in 5 years Upgrade in 10 years OK until next inspection
III Major	Q ₁₀₀₀	< Q ₂₅ Q ₂₅ -Q ₅₀ Q ₅₀ -Q ₁₀₀ Q ₁₀₀ -Q ₂₀₀ > Q ₂₀₀	Immediate drawdown Upgrade in 2 years Upgrade in 5 years Upgrade in 10 years OK until next inspection

16. INSPECTION OF DAMS.

Section 31.19 requires the Department to inspect at least once every 10 years all large dams on navigable streams not inspected by a federal agency. Inspections may also be made if a complaint is received or by Department initiative. The Department may order repairs, alterations or additions or may order partial or total drawdown of the impoundment pursuant to this section if necessary to protect life, health or property.

17. LAND OWNERSHIP.

Section 31.05(3) requires the permit applicant to prove ownership of or an enforceable option to purchase the dam site and at least 65% of the land to be flowed or flowage rights on at least 65% of such land. Copies of deeds, purchase options and tax receipts are sufficient mechanisms to show rights to 65% of the flowage. For further discussion refer to "Easements" above.

18. LEASES.

Section 31.21 requires DNR approval for leases made or executed by a municipality "for the sale or lease of hydraulic or hydroelectric power" from a dam if the lease period exceeds 10 years and the dam was subject to a s. 31.06 or s. 31.08 permit. It should be noted that s. 31.21 is not enumerated under s. 31.33. Therefore, our approval of leases would not be required for those dams authorized by s. 31.33, the Mill Dam Acts or legislative grants, which are on streams that were considered nonnavigable at the time of authorization. Unless a dam was specifically authorized by s. 31.06 or 31.08 it probably will be

necessary to investigate the history of the stream to determine its usage. Streams that were known to be used for commercial navigation or log driving at the time of authorization should be considered navigable and subject to the lease approval process of s. 31.21. For further discussion of navigability refer to Chapter 30.

Our review of any such leases should verify that the following points are adequately addressed in the lease:

- a. The lease should include a condition that the lessee abide by any previously or subsequently issued orders by the Department.
- b. The lease should identify the parties responsible for operation, inspection and maintenance of the dam including appropriate roles of the parties concerned in implementing an emergency action plan.
- c. The lease should include a condition that failure to adhere to the above conditions should be grounds for nullifying the lease.

19. MAP SCALE.

Section 31.12 requires applicants to submit maps with a scale of at least one inch per thousand feet.

20. OPERATION AND MAINTENANCE.

Section 31.18 requires dam owners to operate and maintain all dams, equipment and appurtenances in good repair and condition for the protection of public rights and for the preservation of life, health and property. Except in an emergency the owner may make no substantial alteration or addition to the dam without an authorizing order from the Department.

NR 333.07 requires an adequate operation, inspection and maintenance plan. Depending on the complexity of the dam, the operation plan may have a couple of simple paragraphs or require many pages. The operation plan has three purposes:

- To ensure that all outlet works are operational.
- To ensure that the outlet works are properly operated in a timely manner.
- To instruct operation personnel on appropriate procedures.

The operation plan should describe briefly and simply how the dam will be operated. The instructions should describe the function of the dam and list operational requirements to minimize flood hazards or comply with any other requirements such as minimum flow releases, minimum and maximum established pond levels, drawdown procedures, etc.

To evaluate and "fine tune" dam operation, it is important that the operation plan include a log of rainfall occurrences and amounts, pond levels, weather conditions, equipment operated and other general comments and observations. See Attachment #4 for a sample Operation Plan.

A regular inspection and maintenance program is necessary to protect the dam owner's investment and ensure that the dam fulfills its intended purpose. Maintenance is the work necessary to prevent deterioration and to protect components of a dam. A systematic and regularly scheduled and documented inspection program allows a dam owner to monitor the condition of the dam and plan the

maintenance program in advance.

Inspection plans should identify all components of the dam and physical conditions which, if neglected, could lead to failure of the dam. Embankments should be checked for seepage, slope stability, surface erosion, animal burrows, adequacy of ground cover and adequacy of other slope protection measures. Concrete components such as spillways, abutments, piers, downstream apron, etc., should be checked for spalling, cracking, slipped joints or other movements, erosion, etc. All sluice gates, tainter gates, stoplog gates, or other outlet works should be checked for deterioration, deformation, seal leakage, adequacy of lifting or operating mechanisms, etc. Other physical conditions such as downstream channel obstructions, material buildups, erosion or scour holes, etc., should be noted as appropriate.

Maintenance plans should identify routine work items to be done on a regular basis and identify and schedule other work items noted through the inspection program. Among the items to be included in a routine maintenance plan would be removal of trees and brush from dam embankments, periodic mowing or cutting of dam embankment vegetation, filling of animal burrows and animal control, checking for debris or obstructions in spillway channels and outlet works, seeding or riprapping embankment areas damaged by erosion, painting, servicing mechanical equipment, keeping access roads clear and usable, etc.

Inspection and maintenance plans should specifically state the following:

- a. Who is responsible for routine inspections and how often the structure will be inspected.
- b. The source of maintenance funds e.g., does the replacement money for a tainter gate come from readily available funds or must it be allocated from a governmental body?
- c. Who is responsible for maintenance of the dam and who must they notify in the event of a significant repair.

See Attachment #5 for a sample Inspection/Maintenance Plan.

21. PROFESSIONAL ENGINEER.

The Department requires that plans for construction or major alterations of dams be prepared by a Wisconsin registered professional engineer pursuant to NR 333.05 to ensure protection of public rights and to promote safety and to protect life, health and property. The department may require that plans be submitted by a professional engineer where necessary to protect public welfare.

22. PUBLIC INTEREST.

Under ss. 31.06 and 31.08 the public interest must be protected in granting permits for dams. Sections 31.06 and 31.08 identify several components of the public interests and specify how they should be protected. Comparisons must be made between existing ecological, aesthetic, and recreational values at a proposed dam site and the ecological, aesthetic, economic and recreational values resulting from dam construction.

23. PUBLIC RIGHTS.

Section 31.06 requires the department to compare the public rights of recreational use, enjoyment of natural scenic beauty and environmental quality of the river in its natural state to those of the flowage. Sections 31.18 and 31.185 provide that any permit for transfer, alteration or abandonment must have

provisions to protect life, health and property, promote safety, and preserve public rights in navigable waters.

24. RAISE AND ENLARGE.

Section 31.13 requires that many of the considerations which are required for new dams be given to raise and enlarge a dam. These considerations include obstruction to navigation and protection of life, health, property and public rights

25. REPAIR OR RECONSTRUCTION.

NR 333.03(23) defines reconstruction as "alteration of an existing dam in a manner which affects its hydraulic capacity or structural integrity." Reconstruction is interpreted as meaning a significant change or modification (alteration) of a dam from its original configuration. With this understanding it is clear that the dam's structural stability or hydraulic capacity will also change and that the dam must meet NR 333 requirements within 10 years of a preliminary dam hazard rating for a dam that is to be reconstructed, unless we order earlier compliance under Ch. 31.

There are situations (where reconstruction is not being proposed) when upgrading a dam for compliance with NR 333 should be considered.

Whenever a dam is in such poor condition that it is a threat to life, health and property and failure is imminent we should order an immediate reservoir drawdown to remove the impending threat. Depending on the severity of the situation, we can order either immediate compliance with NR 333 or start the "10-year time clock" for upgrading by making a preliminary hazard rating. Note that the department can order "reconstruction" under NR 333.04(1)(b)3 or major repair under s. 31.19(5). In order to be parallel with ch. 31, NR 333.04(1)(b)3 should be interpreted to read "Unsafe existing dams which are ordered to be reconstructed or repaired".

In cases where a dam needs major repairs, but failure is not imminent, we should make a preliminary hazard rating prior to approving repair. This action will require the dam owner to bring his dam into compliance with NR 333 within 10 years. Knowing that he needs to upgrade the dam an owner may be able to at least partially upgrade his dam with minimal extra cost during the repair process.

In cases where a dam needs major repairs but does not endanger life, health or property, we may consider approving the repair plans without requiring compliance with NR 333. It is an owners decision as to how quickly they comply with NR 333 standards.

A matrix of various dam maintenance, repair or reconstruction activities is provided as a quick reference at the end of this chapter as "Attachment 2" to categorize the activity and determine whether or not NR 333 compliance is required.

26. STABILITY ANALYSIS.

NR 333 requires a stability analysis of a dam. The documentation of structural stability should include the following:

- a. Structural stability calculations for all concrete structures. These calculations should include the following loading conditions.
 - 1) Normal reservoir levels (base flow) and silt loading.

- 2) Normal reservoir levels, silt loading and ice loading.
- 3) Maximum pool levels (design flood) and silt loading.

Design of Small Dams by the United States Department of the Interior includes an excellent discussion of the techniques that should be used to determine the stability of concrete structures (see "Concrete Gravity Dams," pages 329 through 342 of the second edition). This analysis is based upon a foundation pressure approach rather than solely a summation of moments analysis. The foundation pressure approach is superior to the overturning analysis since it assures that the appropriate static uplift pressure will be used.

If the foundation material is rock, a shear friction factor (SFF) approach should be used to determine resistance to sliding. If the foundation is a non-cohesive material, a sliding factor of safety (FS) approach should be used.

Allowable shear friction factors

- 1) High hazard dams for normal loading conditions $SFF > 4.0$
High hazard dams for maximum pool or ice loading conditions $SFF > 2.0$
- 2) Low or significant hazard dams for normal loading conditions $SFF > 2.0$
Low or significant hazard dams for maximum pool or ice loading conditions $SFF > 1.25$

Allowable friction factors

- 1) All dams on noncohesive foundations, for normal loading conditions $FS > 2.0$
 - 2) All dams on noncohesive foundations for maximum loading conditions $FS > 1.25$
- b. Earthen dike stability calculations based upon estimated and known soil parameters. Loading conditions for these calculations should include normal (base flow) and design (design flow) pool reservoir elevations. Minimum acceptable earthen embankment slopes are 3H:1V for upstream slopes and 2.5H:1V for downstream slopes. These slopes are considered to be the minimum acceptable slopes for stability purposes, unless a stability analysis proves otherwise. Flatter slopes of up to 4H:1V may be required to allow adequate maintenance to be performed.

The documentation of stability should be based upon actual calculations. The seal of a state or local agency or a professional engineer is required but not considered adequate, by itself, as documentation of structural stability.

27. SUBMERGENCE.

Section NR 333.07(3) allows for reduced hydraulic capacity if the structure is submerged by flows less than the minimum hydraulic capacity specified in NR 333.07. Submerged is defined to mean that the difference between the water surface elevations upstream and downstream from a dam is one foot or less. Submissions for these types of structures should include the following:

- a. Calculations which demonstrate that the dam can safely pass the flow up to the point of submergence.
- b. Stability analyses of the dam which consider sliding, overturning and foundation failure during base flow and flows up to submergence.

- c. The estimated cost of the project as stated in NR 333.05(3)
- d. An adequate operation, inspection and maintenance plan.
- e. An adequate EAP. The EAP for a dam which becomes submerged should be based upon failure during base flow conditions.

28. TIMBER REMOVAL FROM FLOWAGES.

Under s. 31.18(4) the department may require applicants for dam permits to remove from the flowage prior to flooding all or any portion of the standing and fallen trees and all or any portion of the brush. The plan, which requires approval by the Department, should include the nature, extent and time for removal.

29. TRANSFER OF OWNERSHIP.

Section 31.185 requires a permit for the transfer of dams authorized under s. 31.06 or 31.08 and any other dam over which we have subsequently obtained jurisdiction.

Section 31.21 deals with transfer of any permit granted under ss. 31.06 and 31.08. It requires that the Department investigate and make a finding that:

- a. The transfer does not create a condition prohibited by s. 196.665.
- b. The transfer complies with s. 31.14(2) or (4).

Section 31.21 also prohibits transfers of permits granted to municipalities to private individuals and ownership of dams by foreign corporations.

Dams authorized by s. 31.33, the Mill Dam Acts and legislative grants, which are on streams that were considered nonnavigable at the time of authorization, do not require a permit from the Department unless the Department has obtained jurisdiction by some earlier action, (e.g. reconstruction, enlargement permit, etc.). It probably will be necessary to investigate the history of the stream to determine its usage.

Streams that were known to be used for commercial navigation or log driving at the time of authorization should be considered navigable and subject to the transfer procedures of s. 31.185.

Although some dams do not require a specific permit to transfer ownership, all dam transfers (except cranberry dams) must comply with s. 710.11. Section 710.11 requires that a person may not accept the transfer of the ownership of land on which a dam is physically located unless the person complies with s. 31.14(4).

The phrase "the specific piece of land on which the dam is physically located" should include an area of sufficient size to allow the owner to work on the dam and to allow for access to the dam. Transfer of other portions of a parcel of land not reasonably and physically necessary to allow the owner of the dam to operate, maintain and repair the dam and its appurtenances, including the area necessary for ingress and egress could occur without receiving Department approval. However, any transfer which is made by the owner of the dam in the vicinity of the dam should be brought to the Department's attention so we can determine the land area necessary to service and operate the dam and advise the landowner of the same.

The creation of s. 710.11 was intended to ensure that people working in the real estate profession,

including brokers, attorneys and mortgage insurance companies, will be aware of the requirements of s. 31.14(4) and 31.185(1) & (2). This awareness should enable the Department to maintain accurate records regarding dam ownership and to improve the administration of its dam safety program.

For dam transfers under a land contract it is necessary to review the project for financial responsibility compliance at the initiation of the land contract. It is better to advise the land contract purchaser of the potential requirements for a bond, letter of credit, or other form of surety, and the amount of that surety, at the outset of the land contract. If we do not complete these steps at this time, we can end up with a situation where the land contract purchaser puts out a substantial amount of money and at the end of the land contract period determines, because of financial responsibility requirements, the purchaser cannot take over the property involved.

Therefore, under a land contract purchase, the individual who is purchasing the dam should be formally advised as part of the land contract that he or she will have to meet the financial responsibility requirements of s. 31.14. We should determine at the outset what the amount involved is and that should be made known to the land contract purchaser as part of the land contract. It will not be necessary for a bond or other form of financial surety to be provided at the inception of the land contract, but rather that the submission of the financial surety should occur at the time that the transfer of the deed occurs.

30. UNAUTHORIZED DAMS.

If an investigation identifies unauthorized dams that have a negative water quality and fish habitat effect, and the department concludes they should be removed, the following procedure should be used:

- a. Initial steps:
 - 1) Attempt to determine ownership
 - 2) Research the original authorization or lack thereof
 - 3) Seek voluntary removal or modification of structure.
- b. If step a. doesn't work then we can follow procedures identified under s. 31.253. These procedures involve conducting a public informational hearing or publishing a Class 2 notice stating we will seek or cause removal of the dam without a public informational hearing if one is not requested within 30 days. Upon completion of the public informational hearing or 30 day notice period as the case may be, an order may be issued for removal of the dam. Such order should include appeal rights and if so appealed may result in the need for a contested case hearing pursuant to s. 227.42 If the owner does not comply with the removal order, citations may be issued and the matter further pursued through the local District Attorney's office. If cooperation and compliance cannot be obtained through the District Attorney's office, it may be necessary to refer the matter to the Attorney General's office for enforcement under s. 30.03.
- c. If we can't find an owner, we can use s. 31.187 for removal of abandoned dams.
- d. If we feel a dam meets applicable requirements, it can be authorized.

31. VIOLATIONS.

Section 31.25 declares that dams constructed or maintained in violation of Chapter 31 or not equipped as required, are public nuisances and may be abated at suit of the State or any citizen. Section 31.23(2) provides for a forfeiture of not more than \$1,000 for violating any of the provisions other than those mentioned in s. 31.23(1) or orders made by the Department pursuant to Chapter 31.

32. WATER QUALITY STANDARDS.

Section 144.27 provides: "144.27 Limitation. Nothing in this subchapter affects ss. 196.01 to 196.79 or Ch. 31" Therefore, NR 102 (Water Quality Standards) and Chapter 144 (the statutory authority for NR 102) are not applicable to approval or denial of dams. However the Department has the power and authority under s. 31.12(2) as provided by s. 31.33(1) to approve (or deny) dam plans if the dam meets (or doesn't) the standards of s. 31.02(2) and 31.12(2) to conserve and protect life, health, property and the public rights in the stream. Public rights include water quality and the protection of water quality (nondegradation).

NR 102 establishes water quality standards for surface waters of the state and describes the designated use categories for such waters and the water quality criteria necessary to support these uses. Water quality standards should protect the public interest, which includes the protection of public health and welfare and the present and prospective uses of all waters of the state for public and private water supplies, propagation of fish and other aquatic life and wild and domestic animals, domestic and recreational purposes, and agricultural, commercial, industrial, and other legitimate uses.

33. WETLANDS.

NR 1.95 states the DNR Board policy which requires the DNR to consider the need for protecting wetlands in the decisions made by the Department.

NR 103 establishes water quality standards and implementation procedures to be applied by the Department in making decisions affecting wetlands. The Department presumes that wetlands are not to be adversely impacted or destroyed. NR 103 further specifies the balancing test to be used by the Department when determining whether or not to issue a permit that involves wetlands. For further discussion on wetlands refer to Chapter 180.

34. ZONING.

Dam development, maintenance and repair are not exempt from county zoning regulations. Section 144.27 states that "Nothing in this subchapter affects ss. 196.01 to 196.79 or Chapter 31." Thus, if local zoning regulations adopted under s. 144.26 (such as shoreland provisions) conflict with dam safety requirements under Ch. 31, the conflict must be resolved in favor of the public safety concerns of Chapter 31 for maintenance or repair of dams.

The general rule of law is that all relevant statutes must be applied to a fact situation and where there is a conflict between statutes, the more specific law governs. Here zoning statutes require local governments to administer shoreland and other zoning regulations (ss. 59.971, 61.351, 62.231, etc.). These "environmental" statutes must be read together with the public safety provisions of Ch. 31 related to dams so that both requirements of law are applied where they are not in conflict.

Where regulations are incompatible, s. 144.27 directs that the Ch. 31 provisions will supersede. For example, a DNR repair order or required maintenance under Ch. 31 may compel removal of trees and shrubbery from a dike to maintain its stability. Local shoreland zoning restrictions on clear cutting adjacent to waterways which would ordinarily prohibit such removal would be overridden by the Ch. 31 concerns. Another example may be an ordered emergency or permanent draw down of an impoundment which results in the drainage of upstream wetlands without benefit of wetland rezoning under local ordinances.

Shoreland permits may be required by a county to assure that dam repair activities are accomplished in a

manner that controls erosion and protects other environmental interests provided such permits are issued in a timely manner which allows compliance with any deadlines included in a Ch. 31 order. As a practical matter this will provide an opportunity for local governments to address additional zoning concerns which do not contradict the substance or urgency of Ch. 31 dam maintenance and repair concerns. Compliance deadlines in Department orders should allow sufficient time for owners to acquire any necessary local zoning permits unless such a delay would compromise the objectives of the Ch. 31 order. The order should specifically state that: 1) local governments may impose additional conditions on the repair activity which are not inconsistent with the Ch. 31 order, and 2) failure to obtain local authorization does not relieve the owner of the duty to comply with a Ch. 31 order.

In some instances emergency orders for dam repair or draw down will require immediate action to avert imminent dam failure without the benefit of local zoning permits. In other cases Department staff should coordinate ordinary dam maintenance with local zoning concerns and include advice to dam owners in Ch. 31 orders that local authority may be required for some dam related activities. The advice should include the name, address and phone of the local zoning office and a copy of any correspondence should be forwarded to that office.

[Process Matrix grid appears here]

E. PROCESS

1. ABANDONMENT.

a. Application - Often, dam owners are reluctant or unable to spend the amount of money necessary to repair or maintain the dam. The dam owner is not obligated to maintain the dam forever. The owner is ready to abandon the dam or to transfer ownership to anyone. Commonly, no one wants to acquire the dam but there is much vocal opposition to abandonment. We usually recommend that the owner apply to abandon the dam. A public hearing may help to find a financially capable entity to accept transfer of the dam.

In addition to the information in the "Permit to Abandon A Dam" (Form 3500-30), an application must also specify:

- 1) Proof of ownership of the dam.
- 2) The drawdown procedure to be used prior to dismantling of the dam.
- 3) The parts of the dam that will be removed to render it abandoned.
- 4) The method by which the dam will be removed.
- 5) The disposal site for dam materials.
- 6) Stream channel and flowage bed restoration and protection needs.
- 7) Also see D.1.

Removal of a dam would modify flood profiles both upstream and downstream. Any existing floodplain ordinance should be modified to reflect the changes.

b. Field Investigations - The investigation should consider:

- 1) Whether the removal plan is adequate based on the site and structural features of the dam.
- 2) Potential safety problems with remaining portions of the dam.
- 3) Impoundment bank features which might indicate potential erosive conditions caused by the

- proposed drawdown.
 - 4) Sediment contamination and erosive conditions to determine adequacy of proposed restoration measures.
 - 5) Impact on riparian property, existing uses and fish/aquatic life.
 - 6) Future public uses (navigation and incidents thereof).
 - 7) Time limit for completion of the abandonment.
 - 8) Also see D.1.
- c. Environmental Analysis** - NR 150 identifies the abandonment of a large dam as a Type II action which requires that an Environmental Analysis be prepared; however, abandonment of small dams is a Type III action.
- d. Notice and Hearing Requirements** - Sections 31.18 and 31.19 can be used to issue an order without a hearing; however, s. 31.185 requires a public notice and hearing (if requested).
- e. Final Disposition** - Permits should be conditioned to ensure protection of public interests and may require:
- 1) Removal of specified portions of the dam.
 - 2) Safe and appropriate dam dismantling methods.
 - 3) Proper disposal of removed materials.
 - 4) Restoration of the site to a stable condition.
 - 5) Measures needed to retard erosion of sediment from the new channel and exposed lakebed (above the dam) as well as techniques to trap sediment from flowing downstream. Refer to erosion control specifications under "Abandonment" in the Standards section.
 - 6) Approval of a final engineering plan for approval.
 - 7) Also see D.1.

2. ALTERATIONS, RAISE AND ENLARGE.

- a. Application** - Because of the technical nature of most dam alteration proposals, the Bureau should be appraised of such proposals immediately. Large dams may need to comply with NR 333 standards. The application to alter a dam must generally specify:
- 1) Property description and proof of ownership.
 - 2) Plans for proposed alterations.
 - 3) Documentation of financial capability to complete the project.
 - 4) See D.15.
- b. Investigation** - The investigation should consider:
- 1) Potential safety problems.
 - 2) Other repairs.
 - 3) If operational levels as well as maximum and/or minimum releases are adequate.
- c. Environmental Analysis** - Alterations to large dams in navigable waters that may affect the level of the flowage or release of water downstream are Type II actions which require an Environmental Analysis. Raising and enlarging dams in either navigable or nonnavigable waters are Type III actions. All other alterations are Type IV actions.
- d. Notice and Hearing Requirements** - Section 31.18 can be used to issue an order without a

hearing. Section 31.185 involves a permit process which requires public notice and a hearing (if necessary) prior to issuance.

e. Final Disposition - Permits or orders should require that:

- 1) The permit is not in effect until plans have been approved.
- 2) The dam owner is financially capable.
- 3) Adequate operating procedures, levels and flows, are established or reaffirmed.
- 4) The necessary easements or legal arrangements are obtained prior to construction from all property owners affected by the increase in the regional flood elevation.

3. CONSTRUCTION.

a. Application - Manual Code 3506.1 establishes the procedure for processing applications for dam construction.

Proposed dam projects also generally call for an early consideration of engineering aspects of the proposed project. Timely contact with the program engineer in the Water Regulation Section should be made.

An application to construct on a navigable stream should use form 3500-10, "Permit to Construct A Dam". An application to construct a dam on a nonnavigable waterway requires plan approval, and should include information on Form 3500-53 and the information detailed on attachment #6 (Dam Plan Approval Information Requirements).

Dam plans required for initial review and notice of hearing may be rather general in nature. They should include sufficient detail and be referenced to a retrievable benchmark, preferably in MSL datum, and indicate the following:

- 1) **Important Operational Features**
Features of the dam including embankments, foundation preparation, and spillways should be shown on the initial plans. Spillway detail should include types of gates, preliminary sizing of gate openings, closure devices for gates, and elevation of gate sills and open spillway crests. The watershed drainage area and other hydrologic features should be provided along with calculations done to size the dam spillways. Final plans for large dams will need to comply with the standards contained in NR 333.
- 2) **Operating Levels**
Operating levels for the proposed impoundments should be included in the information received for the proposed dam. The levels might include a maximum which would be in effect year round and one or more minimum levels. It may be desirable to have a minimum level that would apply during the open water boating season from approximately May 1st through November 1st and a winter drawdown level that would operate during the remainder of the year in the interests of minimizing ice damage to shorelines and to provide a storage cushion for spring runoff. These operating levels may very well be changed during the discussion of the project prior to the regulatory decision but should be indicated in a preliminary way for the sake of discussion during the investigation of the project. See handbook Chapter 130 (Water Levels and Flow) for additional information.
- 3) **Impoundment Characteristics and Preparation**
The application should include the following information about the proposed impoundment:

- a) A topographic map at a scale of not less than 1 inch = 1,000 feet depicting the flowage.
- b) Acreage and volume at normal and maximum pools.
- c) Plans for clearing and grubbing.
- d) Other proposed work such as beach developments, shoreline protection, fish and wildlife habitat.

It is important to note that impoundment preparation work completed prior to filling is considered part of the project authorized under the permit for the dam. Impoundment modifications after the impoundment is filled will require additional approvals.

- 4) **Land Ownership**
Land ownership information for the project area must be given to the Department for use in mailing notice of the project proposal and hearing notices if required. This land ownership information is also important in determining compliance with ss. 31.05(3) or 31.14(3).
- 5) **Financial Responsibility**
Financial responsibility is critical to long-term operation and safety. Consideration of this requirement should begin early in the approval process. The detailed procedure is found in attachment #1.

b. Field Investigation

- 1) **Dam Site**
The dam site investigation should consider geology, soils, topography and vegetation. The latter often indicates groundwater emergence which would require special consideration in the dam design. Take special care in investigations in the Driftless Area of southwestern Wisconsin because several failures occurred in the abutments of dams during floods in the summer of 1978.
- 2) **Impoundment**
Investigation of the proposed impoundment area should consider the proposed operating levels as they relate to the shoreline configuration. Soil types in the shoreline area should be considered to anticipate erosion potential of the shoreline.

Shoreline area use should be discussed to determine what enhancement activities should be considered as a part of the permit for the dam. Swimming beaches, marina facilities such as wharves or breakwaters, and erosion control measures are all candidates for shoreline preparation activities.

Impoundment bottom enhancement activities should also be considered. Fish management devices such as fish cribs or artificial rock shoals for fish spawning can be considered. The flowage should be examined to determine what timber and brush should be cut to improve fish and wildlife habitat. The construction or preservation of wetland areas at the entrance of the stream into the proposed impoundment area should be considered as a sediment trap as well as a conservation area. The uppermost portions of the impoundment are seldom suitable for intensive recreational use but are often suitable for many fish and wildlife activities.

Impoundment bottom soil types should be evaluated carefully to detect any soil types which would have the potential to become floating bogs. Peat soil under a well-rooted cattail stand or under cedar swamp vegetation are examples of soil type/vegetation complexes which tend to

float.

3) Streams

Investigate the stream within the project reach, keeping s. 31.06 standards in mind. Both recreational and scenic beauty values, as they naturally exist and as they would exist if the impoundment were built, should be considered.

4) Watershed Hydrology and Stream Hydraulics

Watershed hydrologic analysis and stream flow hydraulic analysis will be reviewed or made by engineers in the Water Regulation Section. Investigators performing the field investigation should check the information provided by the applicant to be assured that adequate information is available for these analyses.

5) Project Sites

Information provided by the applicant should be confirmed and additional information developed as needed for the appropriate level of environmental review to be performed. In many instances, additional information will be required from the applicant.

- c. **Environmental Analysis** - Constructing large dams in navigable or nonnavigable waters is a Type II action requiring an Environmental Assessment. All other dam construction activities are Type III actions requiring public notification through a news release.
- d. **Notice and Hearing Requirements** - For dams on navigable streams, the Department issues a public notice pursuant to s. 31.06. Special interest groups, including environmental and sportsmen's groups, property owners associations and others, should be notified. No hearing is held unless one is requested by the public or the Department. Notice and hearing are not required for dams on non-navigable streams but an informational hearing may be held if appropriate.
- e. **Final Disposition** - Components of a permit and order for a dam permit include the heading, the **FINDINGS OF FACT**, the **CONCLUSION OF LAW**, the **ORDER**, and **APPEAL RIGHTS**. It is important to note that the plan approval for the dam usually follows but may accompany the issuance of the permit.

Findings of fact include procedural jurisdictional requirements, ecological facts about the existing condition of the proposed project site and of the project site in a completed condition. Economic factors appropriate to the decision should be presented.

A finding is required on the aesthetic impact of the project. This will truly be a judgement call either by the staff person drafting the order if no hearing has been held, or by the hearing examiner in the case where a hearing has been conducted. The required comparison of recreational values must also be included as a finding of fact.

Technical findings of fact include a benchmark description and elevation (mean seal level) for reference in further proceedings following the permit issuance. A general description of features of the dam should be included as a finding of fact. Proposed water levels (maximum, minimum, and normal) and their impact on fish and wildlife values should be included. A finding of fact regarding the environmental impact of the proposed project must be included.

Conclusions of law must indicate our authority under Chapter 31, Section 1.11, and NR 150.

The order must include a granting of the authority or denial as appropriate along with conditions

requiring plan approval of the dam and preparation of the flowage bed prior to construction of the dam if authority is granted. Impoundment levels should be established in the order. Water discharges through the dam to insure adequate downstream flows should also be detailed. We usually establish a maximum and at least one minimum with perhaps a seasonal drawdown if appropriate. Conditions for the clearing and grubbing of the impoundment as well as other special conditions should be included in the order.

See sample permit in Handbook Ch. 200.

- f. Monitoring** - It is important to assure that no construction on the dam begins until plans have been approved. Impoundment preparations must be completed prior to filling the impoundment. Closure of the dam for filling must include maintenance of sufficient downstream flow as required in s. 31.34, to protect public rights. Special caution is necessary at the first filling of the impoundment when debris coming out of the impoundment might clog the discharge works at the dam.

For large dams, there should be site inspections during construction.

After completion of the project, timely inspection of the dam should be performed to make sure that water levels are being maintained at their prescribed levels and that proper maintenance of the dam is being performed.

The Water Regulation Section will establish a field file for new dams on navigable streams. Field files will be maintained at Madison and the appropriate district office.

4. INSUFFICIENCY.

Measures may be undertaken to ensure the structural integrity of a dam upon the owners initiative or Department initiative, or complaint. The program engineers should be notified early in the process.

- a. Environmental Analysis** - Approval of temporary drawdowns for safety inspections if below an ordered minimum level are Type III. Drawdowns to relieve unsafe or dangerous conditions are Type IV actions.
- b. Notice Requirements** - Sections 31.18 and 31.19, are often used to order immediate improvements in hazardous situations. No notice is required. A potential safety hazard for public recreation near an existing dam due to proposed alterations may justify public notice and hearing provisions under s. 31.185.
- c. Field Investigation** - A dam safety inspection is required. The inspector must document the findings on a Dam Inspection Report (Form 3500-74). The original should be put in the dam file. The inspector should contact the owner, provide him with a copy of the inspection report and see that necessary repairs are made.
- d. Final Disposition** - Inspectors may determine that the dam is not in need of immediate repair or may order repairs and determine the degree of urgency in making those repairs.

During routine work assignments in the vicinity of dams, a casual check in passing is useful in turning up safety problems.

After a permit or order has been issued for alteration or repair of a dam, it should be inspected to ensure compliance.

- e. **Emergency Procedures** - Manual Code 3561.2 establishes the procedure for emergency situations.

Occasionally problems will develop that may threaten the immediate safety of the structure. In such cases, the downstream area should be assessed to determine probable dangers resulting from the anticipated failure. If human life is threatened, we should take emergency action to draw down the impoundment and begin evacuating the downstream area. If property damage may be substantial we may also want to take similar action. In most cases, the sheriff's office is an appropriate contact to aid in an evacuation attempt.

If any emergency threatens the dam, we should order the owner to draw down the impoundment and/or effect immediate repairs. If the dam's spillway is impaired so that a drawdown cannot be facilitated the structure should be breached. The owner may make alterations to the structure if an emergency exists without obtaining authority from the Department. Where possible, the engineers should coordinate with area managers.

The program engineer should be involved in any decision to order an emergency drawdown.

5. OPERATE AND MAINTAIN.

- a. **Application** - A permit is required for persons interested in operating and maintaining a dam which was constructed in navigable waters without legislative permission prior to July 10, 1915.

In addition to the information in form 3500-53 an application must also specify:

- 1) Specific description of the dam site.
- 2) The year in which dam construction was completed.
- 3) Detailed description of the dam and equipment.
- 4) The past, present and future purpose/use of the dam.
- 5) Location of nearest city/village and dam both above and below the dam site.
- 6) Documentation of financial responsibility.

- b. **Field Investigation**

- 1) An program engineer should be involved in the field inspection to determine needed repairs and dam safety considerations.
- 2) Establish time limit for completion of repairs.
- 3) A determination of whether operational levels and flow releases are adequate.

- c. **Environmental Analysis** - A specific type action is not listed for dam operation and maintenance.

- d. **Notice and Hearing Requirements** - The Department issues a public notice pursuant to s. 31.06. No hearing is required unless one is requested by the public or Department.

- e. **Final Disposition** -Permits should be conditioned to insure the protection of public rights as well as life, health and property and should address:

- 1) All necessary repair work.
- 2) The owner is financially capable of maintaining the dam for a minimum of 10 years.
- 3) Adequate operating procedures, levels and flows, are established or reaffirmed.
- 4) Boating safety and portage considerations are addressed.

6. TRANSFER.

a. Application - In addition to the information in the "Dam Ownership Transfer" (Form 3500-13) an application must generally specify:

- 1) Property description and proof of ownership including ownership of flowage rights. For further information on land contract arrangements, refer to "Transfer of Ownership" in the Standards section.
- 2) Party(ies) responsible for safety and repair.
- 3) Documentation of financial capability. The detailed procedure is found in attachment #1.
- 4) Method of land transaction.
- 5) Owner access to the dam for operation, maintenance, and repair.
- 6) Dam initially authorized under s.31.06 or 31.08 must include the provisions of s. 31.21.

b. Investigation

- 1) The Bureau should be involved in the field inspection to determine needed repairs and dam safety considerations.
- 2) Time limit for completion of repairs.
- 3) A determination of whether operational levels and flow releases are adequate.

c. Environmental Analysis - The transfer of ownership associated with all dams is a Type IV action.

d. Notice and Hearing - The provisions of s. 31.06 are applicable except for transfers involving milldams. For detail see the "Transfer of Ownership" in the Standards section.

e. Final Disposition - Permits should be conditioned to ensure the protection of public interests specifically requiring that:

- 1) Responsibility for all repair work is assigned.
- 2) The new owner is financially capable of maintaining the dam for a minimum of 10 years.
- 3) Adequate operating procedures, levels and flows, are established or reaffirmed.
- 4) Flowage easements are transferred where appropriate.
- 5) The owner maintains adequate access to the dam site.

ESTABLISHING FINANCIAL RESPONSIBILITY

A. Types of Owners

Past experience has revealed the advantages and disadvantages of the various classes of dam owners.

1. Federal agencies - A major concern with federal ownership is whether or not the Department will have sufficient control over operation and maintenance of the dam. Federal takeover may substantially hinder the state in fulfilling its trust responsibilities.
2. State/local government - Experience with state/local governments has been mixed. Often state and local units of government don't have the money or personnel to effectively operate a dam. The ability of these governments to finance dam operation and maintenance through taxes is unlikely to improve in the future, especially considering levy limits and the general feelings of taxpayers.
3. Private ownership - Some types of private owners, especially the larger public utilities, have demonstrated responsibility.
4. Foreign ownership - Sections 31.21 and 196.53 prohibit a foreign corporation from holding a dam permit or franchise to operate a dam.

B. Ownership/Operation Arrangements

1. Split ownership - We discourage split ownership because it makes enforcement extremely difficult. Either owner can disclaim responsibility for violation of operating requirements. It is extremely difficult to coordinate repairs. Split ownership, in our judgement, does not assure proper operation or maintenance.
2. Separate owner and operator - A separate owner and operator is an acceptable arrangement. The owner is responsible for damages, due to improper operation of the dam.
3. Multiple operators - Multiple operators make it difficult to fix responsibility for improper actions. There are only a few examples of this situation. Any new ones should be discouraged.

C. Establishing Financial Responsibility

The basis for establishing a dollar figure for financial responsibility is the cost to put the dam in good condition, plus the annual maintenance cost (times an inflation factor) plus the cost of damage in the 100-year flood (times an inflation factor), times the probability of the 100-year flood occurring in the 10-year period. We ordinarily use the 100-year flood and a 10-year period, although the method can be applied to any flood frequency or time period. The previous years CPI inflation rate should be used unless otherwise justified.

$$\begin{aligned}
 \text{Financial responsibility} &= \text{Annual maintenance Cost} \times \text{Inflation Factor 1} \\
 \text{in dollars} &+ \text{Cost of Damage in 100-yr. flood} \times \text{Probability of Flood Occurrence} \times \text{Inflation factor 2} \\
 &+ \text{Up Front Repair Cost}^*
 \end{aligned}$$

* Not added in if present owner agrees to make the repairs prior to effective date of transfer. This figure would be zero for a new dam.

1. Estimation of Annual Maintenance and Damage Costs

The difficult parts of arriving at a dollar figure for financial responsibility is the estimation of annual maintenance cost, the cost to repair expected damage to the dam caused by the 100-year (or other frequency) flood and the cost of initial or up-front repairs. Damage to downstream properties is not considered a damage cost in the analysis.

We should provide an applicant and transferee with our best approximation of the costs so they can decide if the chances of approval are good enough to justify further investment to obtain an accurate number.

Annual operation and maintenance can be composed of a variety of items. But the following items should be considered.

- 1) Semi-annual mowing of all dikes
- 2) Operation, repair and/or replacement of all gates
- 3) Liability Insurance
- 4) Concrete repair
- 5) Burrow hole repair
- 6) Ice removal
- 7) Painting
- 8) Riprap/erosion control
- 9) Vandalism repair
- 10) Flashboard or stoplog repair or replacement
- 11) Monitoring

Estimates of labor costs can be obtained from the quarterly Dodge reports or a current engineering news record. Labor costs should not be reduced due to volunteer labor. Cost of common materials should be obtained from local retail distributors. Cost of concrete should include the cost of dowels, drilling, reinforcing steel, forming and concrete. Cost of heavy equipment can also be obtained from the Dodge reports.

2. The Time Factor

Number of years to consider: the minimum number of years to consider is statutorily 10 but we are clearly able to consider more years based upon the preservation of public rights and public/private developments on the body of water involved. Questions which we need to address are:

Does the dam contribute to public activities/rights which are dependent on existence of the dam? Such as:

- a) Fishing
- b) Boating.
- c) Swimming
- d) Trapping
- e) Ice Skating/Ice Boating
- f) Aesthetics
- g) Flood control
- h) Flow augmentation

What is the degree of enhancement to the public's usage/rights as a result of placement of the dam? Is it moderate, significant or great?

What kind of private/public developments are there which are dependent on existence of the dam? Such as:

- a) Housing
- b) Camping
- c) Parks
- d) Marinas
- e) Swimming
- f) Water supply

The number of years to consider will be a composite of all of these factors. For an impoundment which minimally impacts the above items the number of years to consider should be 10. For a impoundment such as Lake Delton which could severely impact the economics of the entire area, we should consider a 50 year period.

3. Flood Damage

We will consider no structural damage up to the design flood and then consider the possibility of the design flood being exceeded during the mandatory maintenance period. For example: The standard risk equation is:

$$R = 1 - (1 - 1/T)^n$$

where: R = Risk of occurrence in the specified period.
T = Return period of interest (recurrence interval)
n = Mandatory maintenance period

If n = 30 and the design flood is for a 50-year return period (recurrence interval) then:

$$R = 1 - (1 - 1/50)^{30} = .45$$

If the expected damage for exceeding this design flood (50-year) was \$5,000, then the flood damage portion of the financial responsibility equation would be \$5,000 x .45 or \$2,250.

4. Interest Rates Used Within The Financial Equation

From our perspective, interest rates should be conservatively high since we are trying to assure that this dam will be maintained at some future date. A reasonable number to use would be today's 10, 20 or 30 year treasury bond rates. This rate should be several points above inflation rates and should represent a conservative figure. It is also indicative of our best guess about what we expect future inflation rates to be. The appropriate treasury bond length should be associated with the number of years we consider within the above equation.

D. Demonstration of Financial Responsibility

The current ability to provide enough money for dam repairs and maintenance assures the Department that money will be available throughout the 10-year (or longer) period.

The Department has substantial discretion in requiring demonstrable financial responsibility. Section 31.14(2)(a) provides that the Department, in its own judgment, must be satisfied that a potential owner is financially capable of operating and maintaining the dam for at least 10 years.

A prospective owner must demonstrate financial responsibility on the basis of unencumbered personal assets (net worth) or with outside financial guarantees such as bonds or insurance.

Financial responsibility can be demonstrated in the following ways:

1. A trust or escrow account. Proper legal arrangements must be made to ensure that the money is there, and that it cannot be diverted to other persons or uses without Departmental consent. Escrow funds can only be used for maintaining the structural integrity of a dam, including work on the embankment and spillway structures. The interest earned on the escrow account can be used to offset the inflation factor in the calculation of financial responsibility. If the escrow fund is used to make repairs, a recalculation of the escrow fund amount should be made.
2. A surety bond, payable to the Department. The bond provides money to the Department to have necessary work done if the owner defaults.
3. A first mortgage on other property of the prospective owner has been used and would be acceptable with proper legal arrangements. A certified appraisal of the property to ensure that its value is high enough may be required. A second mortgage is not acceptable.
4. An irrevocable letter of credit by an insured lender to the prospective owner under ch. 405, Stats. It is unlikely that such a letter would be issued. The Banking Commission has indicated that issuing a letter of credit for longer than one year is not a good banking procedure. A 10 year letter of credit has been issued by a credit union. A letter for a period of less than 10 years would not, by itself, provide enough assurance of financial capability. However, we have been able to address all our concerns with a series of 1-year automatically renewing letters of credit.
5. Subsection 31.14(5) provides for the establishment, through administrative rule, of a pool of dollars to be contributed by dam owners (who operate the dam for profit) for repairing and maintaining dams. This provision does not apply to owners with condemnation powers (municipalities and public utilities). The maintenance fund allows risk to be shared among a group of owners, providing a form of self-insurance.
6. Municipalities may use one of the above mechanisms or create a special assessment district under ss. 31.38 and 66.60 or provide other assurance that the municipality has or can obtain sufficient funds to

maintain and/or repair the dam. Generally we have not required municipalities to use methods other than their taxing authority to comply with s. 31.14 for municipally owned dams. However, there is no reason why we should not apply this section to municipalities we believe to have an inadequate tax base.

7. Public inland lake protection and rehabilitation districts may use one of the first six mechanisms described above or provide assurance that the district can make assessments sufficient to maintain and/or repair the dam.

A financial statement is not listed as a means of demonstrating financial responsibility. It does not assure the Department that the assets will be available to pay for needed repairs in the future. A financial statement can be submitted with an application as an indication of the financial status of a prospective owner. The statement can be compared to the cost of estimated damages to determine whether 10 years is a sufficient period of time for financial responsibility determinations. If the owner's assets are questionable relative to replacement cost, we should consider a period longer than 10 years (this would result in more stringent requirement).

Assets must be conservatively estimated. If land around the flowage is listed as an asset, the value should be based on no flowage being present. Assets subject to loss in case of dam failure, such as generating equipment, must be adequately insured and should not be a basis for establishing financial responsibility.

E. Establishing Financial Responsibility

As an alternative to the procedures of s. 31.14(2)(a), the explicit requirements of s. 31.14(3), may be used if appropriate. Under this procedure a person must own the flowage bed and a strip of land around the flowage, agree not to transfer the dam without Department approval and dedicate a parcel of land for public access.

F. Establishing Financial Responsibility - Small Dam, Single Owner

For small, low initial cost dams (\$10,000 or less) with a single owner the above requirements may be excessive. Small dams, such as "tin whistle" embankment structures may be built quite economically. When such a dam and flowage is built on the lands of a single owner, no rights accrue to other riparians and less stringent financial responsibility requirements may be in order. An exception might be when exceptional environmental values exist because of the dam and flowage or high risk to life, health or property exists below the dam.

Another reason to require less stringent financial responsibility requirements for these small structures is that the value of the land around and under the dam and flowage could easily exceed the cost of the structure. Appropriate legal arrangements would have to be made to ensure the land remained as security unless other ways of showing financial responsibility could be found.

For these small dams an annual maintenance fund should be sufficient for new construction. For transfer of existing structures initial fix up and an annual maintenance fund should be sufficient.

COMPOUND INTEREST FACTORS

No. of Years	4% Compound Interest Factor		6% Compound Interest Factor	
	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i
10	1.480	12.006	1.791	13.181
15	1.801	20.024	2.397	23.276
20	2.191	29.778	3.207	36.786
25	2.666	41.646	4.292	54.865
30				
50	7.107	152.667	18.420	290.336
100				

No. of Years	8% Compound Interest Factor		10% Compound Interest Factor	
	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i
10	2.159	14.487	2.594	15.937
15	3.172	27.152	4.177	31.772
20	4.661	45.762	6.727	57.275
25	6.848	73.106	10.835	98.347
30	10.063	113.283	17.440	164.494
50	46.902	573.770	117.391	1163.909
100	2199.761	27484.516	13780.612	137796.123

COMPOUND INTEREST FACTORS
CONT.

No. of Years	12% Compound Interest Factor		15% Compound Interest Factor	
	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i
10	3.106	17.549	4.046	20.304
15	5.474	37.280	8.137	47.580
20	9.646	72.052	16.367	102.443
25	17.000	133.334	32.919	212.793
30	29.960	241.332	66.212	434.744
50	289.001	2400.008	1083.652	7217.700
100				

No. of Years	20% Compound Interest Factor			
	Single Payment Compound Amount Factor Given P, to find S: $(1+i)^n$	Uniform Series Compound Amount Factor Given R $\frac{(1+i)^n-1}{i}$ to find S: i		
10	6.192	25.959		
15	15.407	72.035		
20	38.338	186.688		
25	95.396	471.981		
30	237.376	1181.881		
50	9100.427	45497.100		
100				

ATTACHMENT 2

[Table here: Maintenance and Repair Versus Reconstruction]

SUGGESTED OUTLINE FOR EMERGENCY ACTION PLANS

Summary of Plan - Checklist of Key Actions

A. INTRODUCTION

- I. **Purpose & Intent** - Why is an emergency action plan needed in the community? What will the plan do? Should include a statement such as "The purpose of this emergency action plan (EAP) is primarily to safeguard the lives and secondarily to reduce property damage of the citizens of Adams County, living along Spring Creek in the event of flooding caused by large runoff or failure of the Stoney Creek Dam."
- II. **Description of Dam** - Provide a brief description of the dam including location, purpose, name of owner, date built. A sketch of the dam is also helpful. If more detail is needed, such as height, maximum storage capacity or other physical data, include in Appendix.
- III. **Hazard Area** - Provide a brief description of the area that would be impacted by a breach or major flooding. Describe the populations affected and any critical facilities, such as hospitals, rescue and relief facilities, water supply and/or hazardous waste facilities, and bridges that may be significant. An inundation map should be included to show the extent of the hydraulic shadow, and a proposed time schedule of anticipated events based on historic data should also be included.
- IV. **Responsibility and Authority** - Indicate the person or organization responsible for the maintenance and operation of the dam and the persons or groups responsible for implementing various phases of the EAP. The basic authority for carrying out the various components of the EAP should also be cited. See telephone list below.
- V. **Periodic Review, Testing and Updating** - This section should provide the basis to update, extend, and improve the emergency action plan and to ensure readiness for executing the plan.

Include a schedule for carrying out periodic reviews of the plan by the participants at intervals not to exceed 1 year with updating for the changes in telephone numbers and personnel as they occur.

Include procedures and schedules for periodic testing of the plan. Special procedures for those aspects of the plan not susceptible to direct testing should be established and periodic exercise simulating emergencies carried out. Consideration should be given to updating (such as use of "controlled copies"), whereby plan holders are advised of any changes.

DAM OWNER/OPERATOR TELEPHONE LIST

1. State Warning Center

(608) 266-3232

2. Local Police/Sheriff Department

()

3. State Police/Patrol

()

4. Downstream and Upstream Dams and Operators

• Dam Name _____

• Telephone ()

• Dam Name _____

• Telephone ()

5. Downstream Residence/Business

()

6. Hospital/Ambulance

()

7. State Dam Safety Agency

Name: Richard J. Knitter, Wisconsin Department of Natural Resources, Bureau of Water
Regulation & Zoning _____

Telephone: (608) 266-1925

8. Contractor

Name: _____

Telephone: ()

9. Engineer

Name: _____

Telephone: ()

Post this list in a prominent place at the dam and give a copy to all of your operators.

VI. **Approval** - This section should provide the means by which all parties to the plan agree to their responsibilities to review the process and educate the public. The following is an example of a format that could be used:

We, the undersigned, this date acknowledge this (ANNEX or PLAN) as a part of the emergency operation procedure to protect life and reduce property damage in case of an emergency at the Stoney Creek Dam.

_____	_____
Signature, I.M. Dam owner	Date

_____	_____
Signature, County Sheriff, Adams County	Date

_____	_____
Signature, Mayor, City of Springfield	Date

_____	_____
Signature, Director of Springfield Civil Defense	Date

_____	_____
Signature, Chief of Springfield Police	Date

B. IDENTIFICATION OF EMERGENCY

The procedures and means for assuring timely and reliable identification and evaluation of potential or existing emergencies should be included. These would normally explain the events or conditions which indicate an emergency; define the levels of emergency and when each level is reached; describe the data and information collection system and how information is disseminated to the public; describe the analysis process; designate the responsible person(s); and ensure continuous coverage through designation of appropriate alternatives. Include media plan, shelter and food sites, utility shut-off, evacuation information.

For unattended dams, the surveillance and warning system should be described along with the expected reliability and backup system in place to assure that warning is given in the event of failure in the primary system.

C. PREVENTIVE ACTION

This section should discuss those preventive actions that need to be taken at the dam to prevent or delay failure after an emergency is first discovered. Because of uncertainties about their effectiveness, preventive actions usually would be carried out simultaneously with appropriate notification of an alert situation or warning situation.

D. REENTRY AND RECOVERY

This section should discuss the reentry procedures including road and bridge checks, water, gas and sanitation inspections, and damage documentation. Provide information on reentry routes, sanitation and help for the public, and mitigation opportunities.

Appendices

- A. Flood workers: names, addresses and phone numbers
- B. Critical facilities: contact, location and phone number
- C. Structures in hazard area: residents names, potential access problems
- D. Shelters: contact, address, phone number, capacity
- E. Map of evacuation routes
- F. Equipment (vehicles, sand bags, walkie-talkies, short wave, etc.): contact, phone number

SAMPLE OPERATION PLAN

Dam Name: _____

Date: _____

Owner Name: _____

WHO

1. Who operates the dam? (Owner or other agent/employee)

Address: _____

Telephone: _____

2. Who is the backup operator?

Address: _____

Telephone: _____

3. Who maintains the dam?

Address: _____

Telephone: _____

4. Who must be called in an emergency?

Address: _____

Telephone: _____

WHAT

1. What downstream structures would be affected by a flood?
2. What minimum flow, if any, is required for downstream users?
25% of natural low flow is minimum allowable

3. What impoundment levels are required to protect upstream users?

Maximum Elevation
Normal Elevation
Minimum Elevation

WHEN

1. When are gates operated during storm events?
2. When are gates operated during normal conditions?

WHERE

1. Where is emergency power?
2. Where is engineering assistance?

HOW

1. How are gates operated?
2. How often is mechanical equipment operated?

SAMPLE INSPECTION/MAINTENANCE PLAN**DAILY**

Note water surface elevation
 Check security and safety devices
 Make required changes in gates and valves
 Check spillway outflow channel for debris
 Record pertinent information in

Determine reservoir inflow
 Check toe and/or gallery drain flows
 Read weather gauges and record data
 Check log or safety boom
 Check instrumentation schedule

MONTHLY**1. Dam and Reservoir**

Check condition of:
 crest of dam upstream and downstream
 faces visible portions of foundation
 abutment contacts
 galleries
 stilling basin(s)
 critical landslide areas
 reservoir area
 drainage systems, toe drains
 measuring devices
 rodent problems
 security and safety devices

2. Electrical System

Check:
 standby gasoline-engine-driven
 generator run for a minimum of 1 hour
 keep battery charged
 gas supply

Replace:
 light bulb

3. Outlet Works

Grease hydraulic gate hanger
 Check signs that warn public near

4. Spillway

Check:
 for debris in inlet channel
 for operation of gates
 fence condition and caution signs

QUARTERLY**1. Outlet Works**

Operating instructions - up to date and
 legible

2. Spillway

Check and clear bridge drains

Check gate air vents on downstream face
Clean gate control switchboxes

Clean inside of motor control cabinet

SEMI-ANNUALLY

1. Outlet Works

Check:

- hydraulic oil lines
- oil reservoir level in hydraulic system
- rubber seals and seal clamp bar
- hoist cables - lubricate

Lubricate gate rollers

2. Electrical System and Equipment

Change oil in standby gasoline-engine-driven generator

Check:

- exposed electrical wiring
- outlet works valve house
- gate hoists
- spillway bridge

3. Spillway

Check:

- paint on gates
- hoist cables - lubricate
- mechanical hoist bearings
- flexible coupling bearings
- gear cases
- hoist gear case, replace grease
- spur gear units and gear motors

ANNUALLY

1. Outlet Works

Paint:

- metalworks
- color-coded valves
- woodwork and trim

Exercise gates and valves

Check condition of interior and exterior of outlet conduit

2. Dam and Reservoir

Review the Standard Operating Procedure (SOP)

3. Spillway

Check and repaint metalwork:

on spillway
bridge
gates
fence

Operate and exercise gates

Examine stilling basin and downstream
channel

4. Electrical

Check:

electrical conduits
pull-boxes
switches
outlet works valve house
gate hoists
spillway
galleries

5-YEAR PERIOD

Examine intake structure and stilling basin
which normally are under water -less
frequent if experience indicates

OWNER'S INSPECTION CHECKLIST

Dam Name: _____

Date of Inspection: _____

Owner's Name: _____

Any rapid or great change in the condition of your dam should be immediately reported to the State Dam Safety Engineer, Dick Knitter, (608) 266-1925 or the State Warning Center (608) 266-3232.

	NO	YES	<u>IF YES</u>
Surface Cracks?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ¹
Slumping or cracking on the upstream or downstream side?	<input type="checkbox"/>	<input type="checkbox"/>	Contact state agency or engineer
Erosion from runoff, wave action or pedestrian/vehicle traffic?	<input type="checkbox"/>	<input type="checkbox"/>	Repair and stabilize
Embarkment/spillway seepage?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ²
Seepage water muddy? Boils?	<input type="checkbox"/>	<input type="checkbox"/>	Contact state agency or
Top of the dam settled?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ³
Loss of riprap?	<input type="checkbox"/>	<input type="checkbox"/>	Replace and maintain
Trees, brush or burrows on dike? dike	<input type="checkbox"/>	<input type="checkbox"/>	Clear trees, brush, fill holes and seed bare
Spillways blocked?	<input type="checkbox"/>	<input type="checkbox"/>	Clear spillway immediately
Exposed metal rusty?	<input type="checkbox"/>	<input type="checkbox"/>	Clean and paint
Concrete deterioration or cracks?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ⁴

Cracks or uneven movement?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ⁵
Scour?	<input type="checkbox"/>	<input type="checkbox"/>	Monitor ⁶
Pipe joint separation?	<input type="checkbox"/>	<input type="checkbox"/>	Repair
Gates non-operation?	<input type="checkbox"/>	<input type="checkbox"/>	Repair and make operational
Trash racks blocked?	<input type="checkbox"/>	<input type="checkbox"/>	Clean out debris

¹Monitoring surface cracks in the embankment includes tracking the speed with which the cracks widen, and documenting this development through the use of photographs or instrumentation records. Any rapid development requires immediate notification of the State Dam Safety Engineer.

²Monitoring seepage involves determining the quality and quantity of flow through the embankment/dike/spillway. Measure the quantity per unit time, if possible, and note any solid materials carried in the flow, such as sand or other fines. Excessive flows and/or turbid flows require immediate notification of the State Dam Safety Engineer.

³Settlement of the top of the dam can be caused by surface erosion or by internal compaction. Rapid settlement requires immediate notification of the State Dam Safety Engineer.

⁴Concrete deterioration may be patched through routine maintenance procedures. Extreme deterioration should be examined by an engineer. Severe cracking or rapid changes require immediate notification of the State Dam Safety Engineer.

⁵Cracks or displacement of the abutments may occur over time. Monitoring includes determining the rate of change. rapid separation requires immediate notification of the State Dam Safety Engineer.

⁶Scour can be determined by probing the streambed. Abrupt changes or rapid erosion of the streambed requires immediate notification of the State Dam Safety Engineer.

DAM PLAN APPROVAL INFORMATION REQUIREMENTS

Provide Very Short Narrative Descriptions for #'s 9 & 11.

1. Drainage area - # square miles
2. Normal head - # feet
3. Structural height - # feet
4. Normal pool area - # feet
5. Maximum pool area - # acres
6. Normal storage volume - # acre feet
7. Maximum storage volume - # acre feet
8. Length of embankment - # feet
9. Description and size of principal spillway -
10. Maximum discharge of principal spillway - # cfs
11. Description and size of emergency spillway -
12. Maximum discharge of emergency spillway # cfs
13. Maximum total discharge capacity - # cfs
14. Flood frequency of total discharge capacity - # years

CORRESPONDENCE/ MEMORANDUM

STATE OF WISCONSIN

DATE: April 28, 1993 FILE REF: Dam Drawdown Procedures

TO: District Directors

Insert: Chapter 140, Water Reg. Guidebook

FROM: Robert W. Roden

Distribution: All Water Regulation & Zoning Staff

SUBJECT: Procedures for Dam Drawdowns

The purpose of this guidance is to provide consistent administration of the Department's dam drawdown permit authority with consideration to Chapter NR 103, Admin. Code. These procedures are no different than those required for permit actions under Chapters 30 and 31, Stats., and review and approval under Manual Code 3565.1.

The controlled lowering of the water level on a raised lake or flowage below the ordered or normal minimum level (drawdown) can be divided into two actions: emergency and nonemergency.

An emergency drawdown is performed when the potential of imminent failure of a dam exists which could result in loss of life, health or property. Non-emergency drawdowns occur for actions that can include, but are not limited to:

1. Inspection of the structural integrity of the dam;
2. Non-emergency dam repairs or alterations which are Department ordered or owner initiated;
3. Determining/changing maximum and minimum operating levels under s. 31.02, Stats.,
4. Monitoring/surveillance of seepage or other potential structural problems and
5. Abandonment and removal of a dam under s. 30.185, Stats..

Emergency Drawdown Procedures

The immediate nature of an emergency drawdown greatly limits the actions that can be taken to minimize the adverse impacts on surrounding wetlands. Because of the limited time available, the Water Regulation and Zoning Engineer assigned to the dam is responsible to assure that the following are immediately notified for assistance or informational purposes. The assigned engineer does not have to personally contract the following but is responsible to have Bureau or District staff make these contracts immediately.

1. Dam Owner/Local Property Manager if Department owned
2. County Sheriff's Department
3. County Emergency Government Director
- (2 & 3 can be notified through the State Warning Center at 608-266-3232)
4. Local Warden
5. Local Fish Manager
6. District Water Regulation and Zoning Supervisor and Area Water Management Specialist
7. Downstream Dam Owners
8. District Director and Public Information Officer

9. Area Wildlife Specialist
10. District or Area Water Resources Specialist
11. Bureau of Endangered Resources
12. Bureau of Property Management (if dam is State-owned).

Actions taken by these individuals may help minimize the drawdown impacts. For instance, the fish manager may initiate actions to remove and relocate fish or to limit fishing in the area. Endangered Resources may take necessary steps to inventory the area to determine endangered resource concerns. The local property manager/Property Management may take immediate action to make repairs to the dam (if Department owned) so the flowage can be returned to normal level as quickly as possible. Each of these actions may help to lessen potential adverse impacts on wetland functional values.

Non-Emergency Drawdown Procedures

Non-emergency drawdowns are activities in which the Department is directly involved in the permitting/ordering process and has discretion in parts of the decision making process, and therefore must comply with NR 103. Due to the planned nature of these projects, time is available to investigate the wetland impacts and to consider alternatives to minimize them.

All drawdowns must receive a permit docket number or be associated with an approval which receives a docket number. The drawdown may be addressed in the dam plan approval process as long as the plan approval is given a docket number.

Project coordination responsibilities depend on the type of action associated with the drawdown.

The District Water Regulation and Zoning Supervisor (or designee) is the Project Coordinator for drawdowns including changes in operating levels under 31.02, temporary drawdown for construction and/or excavation within the flowage and other flowage management activities such as overwinter drawdowns.

A Department engineer (bureau or district WZ or PM) becomes the Project Coordinator for drawdowns relating to department-ordered and owner-initiated dam repairs. The Project Coordinator must complete and route to applicable staff:

- 1) a 3500-23 form,
- 2) a 1600-1 if required (NR 150),
- 3) a copy of the plans to the applicable staff in the district/area or bureau.
- 4) a copy of the Wisconsin Wetlands Inventory Map for the particular flowage or raised lake, and
- 5) a handwritten summary (due to its confidentiality) of any endangered resource concerns identified in the Natural Heritage Inventory or by Endangered Resources staff.

Applicable staff include but are not limited to:

- local fish manager
- local wildlife manager
- district water resources specialist
- local warden
- district water regulation and zoning supervisor (or designee) or assigned bureau engineer.

The returning comments on the 3500-23 and adjoining forms will help the project coordinator develop the necessary Findings of Fact, Conclusions of Law and Conditions in the Department's Permit or Order.

The attached "Considerations For Impoundment Drawdown" sheet is provided as a guide to help staff in their

analysis of impacts.

Abandonments

Abandonments are slightly different and must follow the ss. 31.185, 31.253 or 31.33, Stats., procedures. Wetland impacts are addressed in the 3500-23 form or the environmental assessment or impact statement. Department decisions or other actions regarding dam abandonments must comply with NR 103. However, under the practicable alternatives analysis, most of these projects will have no practicable alternative other than for another party to take ownership. Therefore, the Department's analysis will primarily address alternatives to minimize impacts to wetlands as a result of the abandonment.

Dams removed by the Department are not exempt from these procedures and the Department must follow existing established procedures presently required for all projects regulated under Chapters 30 and 31, Stats., and M.C. 3565.1 approvals.

Reviewed: Larry Larson
Scott Hausmann

Drafted: Dale Simon
Meg Galloway

Considerations For Impoundment Drawdowns
A Guide For Staff In Their Analysis Of Potential Impacts

1. Are any threatened or endangered resources present? Check Natural Heritage Inventory or request assistance from Bureau of Endangered Resources.
2. Are wetlands associated with the existing flowage? Are there downstream wetlands that may be affected by now fluctuations during drawdown or refilling or due to sediment discharge, erosion etc.? See Wisconsin Wetland Inventory Maps.
3. What type of wetlands (classification) are associated with the flowage?
4. What are the present uses of the wetlands?
5. Will the drawdown adversely affect the uses of the wetlands? For how long?
6. Is the wetland of a vegetative type, non-persistent, that will be destroyed as a result of the drawdown?
7. Does the flowage have any history of containing contaminated sediments? Important for rate of drawdown and potential water quality impacts downstream.
8. If a wetland is present, are the soil types permeable (peat) or impermeable (clay)? Wetlands with impermeable soils are less likely to be impacted by drawdowns as opposed to permeable soils.
9. Is the wetland used for fishery rearing, feeding, or spawning purposes? Will drawdown affect use of the wetland?
10. Is the wetland used for wildlife purposes, feeding, brood rearing, nesting, staging, mating, etc.? Be sure to recognize game and non-game birds, mammals, reptiles, amphibians.
11. Will the drawdown have significant affect on the presences of mollusks, insects, etc.?
12. Please give your recommendations to minimize adverse impacts associated with the drawdown.

CORRESPONDENCE/ MEMORANDUM

STATE OF WISCONSIN

DATE: May 14, 1993 FILE REF: 3560

TO: Water Regulation & Zoning Staff

Placement: Water Regulation Handbook, Chapter 140

FROM: Robert Roden - WZ/6

Distribution: WZ Program Staff

SUBJECT: Program Guidance on Determining the Hazard Rating for Submerged Dams

Guidance

- All submerged dams will be assigned a hazard rating of low.
- The design capacity for the dam will be the flow at submergence or as specified in NR 333.07(3)(a).
- The hazard rating may need to be revised in the future if a downstream restriction causing submergence is subsequently removed or altered.

Statement of Problem

Using the criteria defined in NR 333.06 to determine the hazard rating is unclear when considering a submerged dam. The code does not specify a termination point for analyzing development within the hydraulic shadow and dam nonexistent profiles. Chapter 140 of the Water Regulation handbook does not clearly identify how the hazard rating will be developed for submerged dams either.

Facts to Consider

- "Submerged" means the difference between the water surface elevations upstream and downstream from a dam is one foot or less.
- As defined in NR 333.06, the hazard rating for a dam is determined by development in the hydraulic shadow of the dam and the floodplain/floodway of the dam nonexistent condition and the land use controls in place downstream of the dam.
- When a dam is submerged, the failure of the dam occurs at the point of overtopping, early on the rising limb of the flood hydrograph. Experience has shown the flood wave from the failure is drown out by the rising limb of the regional flood hydrograph. The resulting profile of peak stages, for the area downstream of the dam, for the failure event is equivalent to the regional flood profile. Because the dam and impoundment in submergence cases is hydraulically insignificant to the regional flood event, the dam nonexistent profile is also equivalent to the regional flood profile.

- Previously developed program guidance, now incorporated into Chapter 140 of the Water Regulation Handbook (140-23), directed the dam failure profile to be carried downstream to the point of convergence with either the dam nonexistent or regional flood profile. This area of inundation has been commonly referred to as the "hydraulic shadow" for the dam. In the case of submerged dams the profiles of concern have already converged downstream of the dam at the peak of the flood. Therefore, there is no hydraulic shadow and there can be no development within the hydraulic shadow or dam nonexistent profile as defined in NR 333.06.
- Since submerged dams have no hydraulic shadow and therefore no development within the hydraulic shadow, no zoning other than regional floodplain zoning is required downstream of the dam.

Summary

When a dam is submerged the dam failure profile, the dam nonexistent profile and the regional flood profile can be considered equivalent and converged at the peak of the flood, downstream of the dam.

Since the profiles have converged there is no hydraulic shadow and therefore there cannot be development within the hydraulic shadow. A submerged dam will therefore meet the requirements of low hazard land use classification.

Only regional floodplain zoning is required to keep a low hazard rating for a submerged dam.

The design flow for the dam will be the flow at submergence.

The Department reserves the right to reevaluate design spillway capacity requirements. This may become necessary if the downstream restriction causing the backwater and subsequent submergence of the dam is removed or altered. If the dam is no longer submerged during the regional flood the full design spillway standards of NR 333 must be met.

Drafted By: Meg Galloway

Reviewed By: Dick Knitter
Bob Watson
Ken Johnson

CORRESPONDENCE/ MEMORANDUM

STATE OF WISCONSIN

DATE: June 24, 1994

FILE REF: 3550

TO: District Directors

Placement: Chapter 3 Floodplain/Shoreland Guidebook; Chapter 140 WRZ Handbook

FROM: Robert Roden

SUBJECT: Setting the Preliminary and 'Final' Hazard Ratings for Dams.

I. Introduction

It has become necessary for the Department to establish a uniform procedure for establishing the Preliminary Hazard Rating (PHR) and Hazard Ratings (HR) for dams in the State. The purpose of this guidance is to establish these procedures.

The large influx of dam failure studies into the Department is a result of the increase in the number of dam safety inspections and the Municipal Dam Repair/Removal Grant Program. Directives for development of Emergency Action Plans, issued in many Dam Safety Inspection Reports and application for funding under the grant program result in the requirement for a dam failure analysis. Once a dam failure analysis is provided to the Department, we are required to establish a PHR for the dam.

Wisconsin Administrative Code NR 333 requires the Department to determine a Preliminary Hazard according to the criteria in s. NR 333.06 for all existing and proposed dams. There is also reference to a Hazard Rating in s. NR 333.06(3)(a). PHR's are assigned in cases where criteria for determining the ratings can change. HR's are assigned when the criteria are not subject to change. Details explaining the two ratings and when and how the Department is to assign them is also discussed in this guidance.

Review and approval of a dam failure analysis and timing for spillway capacity compliance is covered in Chapter 140 of the Water Regulation Guidebook and will not be addressed here.

II. When and Who? The Process

A. Dam Failure Analysis is submitted to the Department for one of the following reasons.

1. Because of a dam safety inspection if the inspecting engineer feels the dam poses a threat to life, health or property (basis for an Emergency Action Plan).
2. Because of the owner's initiative.
3. As the result of a dam reconstruction. What constitutes a dam reconstruction can be found on page 140-37 in Chapter 140 of the Water Regulation Guidebook.
4. Because of an application to construct a new dam.
5. Because of a floodplain study that incorporates the existence of dams.

B. The reviewer assigned to review and approve the dam failure analysis does so as outlined in the

program guidance dated July 29, 1992, and assigns the PHR.

1. Based on what the consulting engineer has determined for a PHR and using all available data, the reviewer will confirm what the consultant has found or establish a different PHR for the dam.
 - a. A PHR is to be established based on existing land use control in place and approved by the Department as required by s. NR 333.06.
 - b. The assignment of the PHR must be made before the approval of any plans for construction or reconstruction of the dam. The plans must address the spillway capacity requirements of NR 333.07.
 - c. It is only possible for the reviewer to assign a FHR if the current land use and the current land use controls in place are not subject to change without Department approval.
2. The reviewer establishing the PHR sends an official determination and assignment of the PHR to the dam owner with the approval of the dam failure analysis. Any requirement to upgrade the spillway capacity to meet standards in NR 333.07 must be addressed in the approval letter. Appeal rights are to be included in the document.

III. How? The Details

A. Using the information in the dam failure analysis and s. NR 333.06, "Land use and land use control classification . . .," the Reviewer determines what Preliminary Hazard Rating should be assigned to the dam. The assignment of a PHR can be looked at as a twostep process. The reviewer looks at the current land use classification first and then reviews the land use controls for a final determination. **For the purpose of the following discussion, references to compliant and noncompliant structures means compliance with NR 116. References to Class 1A and 1B, Class 2 and Class 3 refer to Low, Significant and High Hazard dams respectively.** There is a chart attached to this guidance intended to assist you through the process.

1. The dam failure analysis will have identified three flooding profiles, all occurring during the regional flood, for the dam and waterway along with an inventory of structures and campgrounds downstream of the dam that may be affected by either or all of the situations. The three situations studied are a) no failure of the dam, b) failure of the dam, and c) dam nonexistent. The last two, failure and nonexistent are used with the structure inventory and s. NR 333.06 to determine the hazard the dam poses.
 - a. First the reviewer needs to look at whether there are any campgrounds in the dam failure floodplain (hydraulic shadow). If there are campgrounds the reviewer has to determine whether they are in the floodway or inundated to a depth greater than two feet. If either is true the current land use classification cannot be either a Class 1 A or Class 1 B. If this first test is passed, the reviewer goes on to look at the location of other structures downstream of the dam.
 - b. The reviewer will look at the maps, profiles and inventory for the failure situation to determine if structures are present within the hydraulic shadow. If there are structures in this floodplain, the reviewer determines whether they are compliant structures. If they are, a Class 1A or 1B current land use classification becomes a possibility.
 - c. Now the reviewer needs to address whether there are any structures in the dam nonexistent floodplain. If there are none, the dam could have a Class 1A current land use classification. If

there are, the reviewer has to determine what type of structures they are and if they are compliant or not. If the structures meet the requirements of NR 116, the dam could have a Class 1B land use control classification. If the structures do not meet the requirements of NR 116, the reviewer continues the determination process.

d. If the reviewer makes it this far, the dam will be assigned either a Class 2 or Class 3 current land use classification. The reviewer now needs to look at the dam nonexistent floodplain in more detail. Look at the dam nonexistent floodplain to see if there are any campgrounds. If there are campgrounds in this floodplain, the reviewer needs to determine whether they are in the floodway or inundated to a depth greater than two feet or subjected to velocities over two feet per second upon failure of the dam. If either of these criteria is true the reviewer has determined the dam has a Class 3 current land use classification.

e. The reviewer is still looking at information concerning the dam nonexistent floodplain. If there are either homes or government emergency services facilities in this floodplain, and they are in compliance with NR 116, then the dam could have a Class 2 Current land use Classification if **either** of the following is true:

- i. There is development other than campgrounds, homes or government emergency service facilities within the dam nonexistent floodplain that is not in compliance with NR 116. or
- ii. There are homes or government emergency service facilities within the floodplain of the hydraulic shadow but outside the dam nonexistent floodplain that is in conformance with NR 116.

f. Every dam that did not meet the above requirements along the way will have a Class 3 current land use classification. What this means is that current land use below the dam might include campgrounds that are either in the floodway of the floodplain with the dam nonexistent or inundated to a depth greater than two feet or subjected to velocities over two feet per second upon failure of the dam. Dams having a Class 3 current land use classification might also have homes or government emergency service facilities in the floodplain with the dam nonexistent which are noncompliant.

2. Now on the land use controls portion of the PHR determination. The reviewer looks at what zoning is in place and refers to NR 333.06 to determine how to classify the land use controls.

a. If the zoning is in place to control development in the hydraulic shadow then the land use control classification is Class 1A. ****WARNING, NR 116 ALLOWS CAMPGROUNDS IN THE FLOODWAY IF THEY MEET CERTAIN CRITERIA. REVIEW THE INDIVIDUAL ORDINANCE TO DETERMINE WHETHER CAMPGROUNDS ARE ALLOWED. THE MODEL ORDINANCE PREPARED BY THE DNR DOES NOT ALLOW CAMPGROUNDS.****

b. If zoning is in place to control development in both the hydraulic shadow and the dam nonexistent floodplain then the land use control classification is Class 1B.

c. If zoning is in place to control development in the dam nonexistent floodplain then the land use control classification is Class 2.

d. If there is no zoning to control development in the area downstream of the dam, the land use control classification is Class 3.

B. The two classifications are now combined to determine the PHR or the FHR of the dam. This chart provides you with a guide for determining the PHR or FHR of a dam:

LAND USE CLASSIFICATION	LAND USE CONTROL CLASSIFICATION	HAZARD RATING
1A	1A	1A
1A	1B	1B
1B	1A	1B
1A, 1B OR 2	2	2
2	1A, 1B OR 2	2
1A, 1B, 2 OR 3	3	3
3	1A, 1B, 2 OR 3	3

The upgrading of the spillway capacity to meet NR 333.07 must be addressed in the approval letter to the dam owner.

IV. Preliminary Hazard Rating vs. Hazard Rating

A. A PHR is established in cases where the rating could change as a result of more restrictive land use controls downstream of the dam.

1. Sometimes, the Department receives a dam failure analysis in its review and approval and a determination is made about what the FHR of the dam could be if the proper land use controls were adopted downstream of the dam. This is the time that a PHR is assigned to the dam.

a. Where the implementation of more stringent land use controls downstream of the dam would lower the FHR, the reviewer must assign the 'higher' PHR, based on the currently adopted and approved land use controls, and explain the possibility of lowering the FHR. As you know, hazard ratings always address the current condition, not the potential future condition.

b. The document assigning the PHR should identify the possibility of the Hazard Rating being lowered following the adoption of the more restrictive land use controls.

c. The dam owner should be instructed to design any reconstruction of the dam using the PHR not the possible Hazard Rating. If the necessary zoning is adopted and approved by the Department to lower the FHR from the PHR, the FHR needs to be assigned and the spillway capacity determined for the design of the reconstruction.

d. The document assigning the PHR should also instruct the dam owner to contact the Department after the necessary land use controls are in place below the dam. This will allow the Department to review and approve the land use controls and assign the FHR.

2. Following adoption and approval of land use controls that result in a lower FHR than the PHR, or in the case where the land use controls are in place necessary to assign the lowest possible FHR for the dam, the reviewer can assign a FHR.

IV. Summary

The Preliminary Hazard Rating, PHR, is assigned to a dam following the approval of a dam failure analysis submitted as a result of either Department or owner initiated action.

The PHR must be assigned before a plan approval for either new construction or reconstruction of an existing dam.

The PHR reflects the current land use and land use controls in place and approved by the Department on the day of the approval and notifies the owner if a change is possible.

If, or when, the land use controls are in place resulting in a lower than Class 3 rating, a 'final' Hazard Rating is assigned. This may be assigned at the time of study approval if all necessary land use controls are in place and approved by that time.

Drafted by: Bill Sturtevant

Reviewed by: Richard Knitter
Bob Watson
Ken Johnson
Scott Hausmann
Larry Larson

PRELIM.GUD

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

[KEYBOARD](ENTER DAM OWNER'S NAME AND ADDRESS),

SUBJECT: Preliminary Hazard Rating for the [KEYBOARD] (NAME OF THE DAM) Dam,
Field File #[KEYBOARD] (ENTER FIELD FILE NUMBER), [KEYBOARD]
(COUNTY WHERE DAM IS LOCATED) County

Dear [KEYBOARD] (DAM OWNER'S NAME):

FINDINGS OF FACT

1. The Department of Natural Resources has examined the Hydraulic and Hydrologic analyses, including the dam failure analysis, for the [KEYBOARD](NAME OF DAM) Dam, located in the [KEYBOARD] (QUARTER-QUARTER) 1/4, of the [KEYBOARD] (QUARTER) 1/4, of Section [KEYBOARD] (Section), Township [KEYBOARD] (TOWNSHIP) North, Range [KEYBOARD] (RANGE), on the [KEYBOARD] (RIVER OR STREAM ON WHICH DAM IS LOCATED) River.
2. The analysis was performed and submitted by [KEYBOARD] (NAME OF ENGINEERING FIRM THAT PERFORMED STUDY)
3. [KEYBOARD] (ENGINEERING FIRM) has determined that a preliminary hazard rating of Class [KEYBOARD](NUMERIC HAZARD RATING), [KEYBOARD] (TEXT HAZARD RATING) Hazard, would be appropriate for the dam and the area downstream of the dam.
4. The analyses were performed in compliance with Wisconsin Administrative Codes NR 333, and NR 116.
5. There [KEYBOARD] (IS THERE DEVELOPMENT) development in the [KEYBOARD] (FW OR FF OF WHICH FLOODPLAIN?) downstream of the dam. This was determined through the use of [KEYBOARD] (MAPPING?) and site verification by [KEYBOARD] (ENGINEERING FIRM).
6.
 - a. There is zoning in place below the dam in the [KEYBOARD](ID THE FLOODPLAIN ZONING IF ANY)
 - b. Zoning in place below the dam has been approved by the Department.
7. If floodplain zoning were in place and approved by the Department, in the [KEYBOARD](ID THE ZONING NECESSARY FOR THE LOWER HR) a hazard rating of [KEYBOARD] (ID POSSIBLE LOWER HR).
8. The dam as constructed [KEYBOARD] (MEETS NR 333.07 OR NOT?) the spillway capacity requirements of Wisconsin Administrative Code NR 333.07.
9. The Department has determined that the project complies with Section 1.11, Wisconsin Statutes, and Section NR 1.95, Wisconsin Administrative Code.
10. The (preliminary) hazard rating meets the standards of Section 333.06, Wisconsin Administrative

Code.

CONCLUSIONS OF LAW

1. The review has been conducted in accordance with Chapter 31, Wisconsin Statutes, and Chapters NR 333 and NR 116, Wisconsin Administrative Codes.
2. The Department has authority under Chapter 31, Wisconsin Statutes, and Chapter NR 333, Wisconsin Administrative Code, to assign a preliminary hazard rating.

ASSIGNMENT OF THE PRELIMINARY HAZARD RATING

[KEYBOARD](LANGUAGE NEEDS TO BE ADDED SPECIFIC TO EACH DAM THAT REQUIRES SPILLWAY CAPACITY TO BE UPGRADED).

1. The hydraulic and hydrologic analyses are hereby approved in accordance with Chapter 31, Statutes.
2. The (preliminary) hazard rating of Class [KEYBOARD](NUMERIC HAZARD RATING), [KEYBOARD] (TEXT HAZARD RATING) Hazard, is hereby assigned to the dam.
3. The Department reserves the right to review and change the assignment of the (preliminary) hazard rating of the dam should downstream development change at any time in the future.
4. Plans for reconstruction or construction of the dam shall include a stability analysis in compliance with Wisconsin Administrative Code NR 333.05. The hydraulic capacities of the dam are to comply with the requirements of Wisconsin Administrative Code NR 333.07(2) and must be verified in the dam plans submitted to the Department for approval.
5. The spillway capacity shall be upgraded in compliance with NR 333.07 by [KEYBOARD](SET DATE FOR UPGRADE - SEE GUIDANCE).

NOTICE OF APPEAL RIGHTS

If you believe that you have the right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Wisconsin Statutes, you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to section 227.42, Wisconsin Statutes, you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

This notice is provided pursuant to section 227.48(2), Wisconsin Statutes.

This decision was mailed on _____.

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES

For the Secretary

By _____
[KEYBOARD] (REVIEWERS NAME), P. E.
Assistant State Dam Safety Engineer
Bureau of Water Regulation and Zoning

cc. [KEYBOARD] (DISTRICT CC)
[KEYBOARD] (AREA CC)

[Hazard Rating Chart appears here]

HOW TO USE HAZARD RATING CHART

- 1 Start in the upper left hand corner of the chart with 'NO' positioned under the "FW".
2. Ask the question "are there any campgrounds in the floodway of the hydraulic shadow floodplain?" If you answer yes, move down the chart in the same column until you find a "yes" or a "yes/no", then continue through that row asking yourself the same type of development questions as you go. In this case, go to the third line in the chart and start asking questions.
3. Keep moving across the chart from left to right as long as your answer matches the answer in the chart for development each particular floodplain. Remember to ask yourself whether or not the development meets the requirements of NR 116 for the floodway and/or floodfringe. For "yes" answers this is a must. Otherwise the answer to your question is "no".
4. Remember, it is only possible to assign a Hazard Rating if all the answers match up and the proper zoning is in place on the day the assignment is made by the Department.

CORRESPONDENCE/ MEMORANDUM

STATE OF WISCONSIN

DATE: June 6, 1996 FILE REF: 3550

TO: Water Regulation & Zoning Staff

Placement: Water Regulation Handbook, Chapter 140

FROM: Larry Larson

Distribution: WZ Program Staff

SUBJECT: Program Guidance on Dam Plan Review Checklist.

Guidance

- Dam Plan Review will be conducted to ensure new dams and dams to be repaired meet "safe dam" standards.
- The design capacity for large dams will be based on the hazard rating.
- Dam Plans and Specifications will be stamped by an engineer registered in the State of Wisconsin. This requires that Engineer to review and have full knowledge of the design and plans.
- Three copies of the Dam Plans and Specifications will accompany each request for review. In the approval letter, up to three additional copies will be requested for distribution, dependent on addenda and changes to the initially submitted copies.

Statement of Problem

Dam plan complexity makes it increasingly harder to evaluate all aspects of the project. S. NR 333 does not specifically outline what criteria to look for when reviewing plans and specifications. Careful analysis of how the dam is to function, and how the surrounding topography/geography affect the serviceability of the dam is crucial to meeting "safe dam" standards.

Facts to consider

"Safe dam" is outlined in NR 116.08(3).

Dam plan review is to include soils, operation, emergency serviceability, ease of maintenance, structural stability and design capacity.

Dam Name _____ County _____
Field File Number _____ Waterway _____
Dam Location _____
Dam Owner _____ Consultant _____
Owner Address _____
Reconstruction/Repair _____
Hazard Rating _____
What is the required capacity _____
Principal Spillway Capacity _____ = _____ year flood
Emergency Spillway Capacity _____ = _____ year flood
Total Capacity _____ = _____ year flood capacity

GENERAL DESCRIPTIONS

_____ Foundation soil type and preparation.
_____ Is the dam keyed to the foundation?
_____ Embankment/structural height.
_____ Hydraulic height
_____ Available freeboard at design capacity.
_____ Emergency spillway
elevations _____
bottom width _____ side slopes _____
armoring _____
design capacity _____

EMBANKMENTS

_____ Embankment top width and side slopes. (12' minimum, 3H:1V) _____
_____ Embankment fill soil type,
compaction method
maximum lift thickness
_____ Seepage control measures (i.e. cutoff walls, toe drains, anti-seep collars, etc.)

_____ Erosion control addressed on the plans?
_____ Is it adequate? Yes/no
_____ Riprap/bank protection requirements. _____

CULVERTS

_____ Outlet structure type _____
_____ Culvert Length _____
_____ Size, diameter, dimensions _____

_____ Elevations
u/s invert _____
d/s invert _____

_____ joint treatment _____

_____ corrosion protection _____

_____ Seepage Control _____

SPILLWAYS / GATES

_____ Stoplog control.
A. Is there a lifting mechanism? _____
B. Is there a walkway or bridge above the stoplog slots? _____
C. Can the stoplogs be removed? _____

_____ Is there a low level draw for maintenance/sediment passage? _____

_____ Can the gates be lowered against the design head? _____

_____ Can the gates be operated in the winter? _____

_____ Are gate controls off the dam? Is there a backup method of gate operation?

_____ Will sediment build-up interfere with gate operation? _____

_____ Is a drawdown necessary for repairs? _____

_____ Are there stoplog channels for gate maintenance? _____

_____ Water Stops _____

_____ Gate Design _____

_____ Stem Design _____

_____ Gate Operability _____

MISCELLANEOUS

_____ Are the plans and specifications stamped by an engineer registered in Wisconsin?

_____ Has the design flow been routed through the proposed dam?

_____ Will the dam pass the design flow w/out damage?

_____ Cofferdam design on the plans. Designed to Q10. _____

_____ Will a separate permit be required for the cofferdam? _____

_____ Are there utility lines crossing the dam? _____

_____ Do the plans meet NR 333 standards? _____

_____ Benchmark established on the dam and off the dam. _____

_____ Signing (dam warning and portage) _____

_____ Scour Protection. _____

_____ Stilling basin design. _____

_____ Site access and access ownership? _____

_____ If reconstruction,
 _____ Stability Analysis
 _____ Hydraulic Capacity Calculations

_____ Drawdown timing and levels coordinated with area WMS, (fisheries, wetland concerns, etc.)

Drafted by: Daniel Baumann

CORRESPONDENCE/ MEMORANDUM

STATE OF WISCONSIN

DATE: March 21, 1997 FILE REF: 3500

TO: District Directors FERC Coordinators

FROM: Susan Sylvester - AD/5

SUBJECT: 401 WATER QUALITY CERTIFICATION OF HYDROELECTRIC PROJECTS
APPLYING FOR LICENSES (OR EXEMPTIONS FROM LICENSE) FROM THE
FEDERAL ENERGY REGULATORY COMMISSION

The Department has the authority and responsibility to review applications for hydroelectric projects under the Federal Power Act, the Electric Consumers Protection Act, the Fish & Wildlife Coordination Act, and the Clean Water Act in addition to state public trust responsibilities. This document is intended to assist by Department staff in applying existing standards and rules when making decisions regarding Water Quality Certification of FERC-licensed hydroelectric projects.

I. ISSUE SUMMARY

A. LEGAL

As a result of recent court decisions, the state now has the authority to grant water quality certification for the relicensing of hydropower projects. In 1994, the Supreme Court heard the Tacoma case (Jefferson PUD vs. State of Washington) and established that water quantity is an integral part of water quality. Tacoma also held that water quality certificates can appropriately contain conditions to protect biological and physical uses. Accordingly, the Department must issue water quality certifications or denials instead of simply waiving authority. 401 certification must be done on a case-by-case basis applying the State of Wisconsin's statutory and administrative rule standards to the specific project or projects involved.

Water quality certification decisions already made cannot be modified.

B. ENVIRONMENTAL IMPACTS

Evaluation of water quality impacts should go beyond water chemistry to the biological and physical use standards applicable for the waterway. Habitat impacts caused by operations of hydroelectric projects need to be considered as they affect the biological uses of the waterway. Physical changes due to project operations may affect recreational opportunities, including fishing and boating.

Dams are known to have environmental impacts including, but not limited to, the following:

- Change dissolved oxygen content of rivers
- Change temperature distribution of rivers
- Change pH concentration in rivers
- Block fish passage (movement and migration)
- Alter or block the movement of woody debris (structure) in rivers
- Affect navigation due to both physical blockage, insufficient flows, and low water levels
- Affect incidents of navigation such as wading, swimming, hunting and fishing
- Affect biodiversity

- Cause accumulation of sediment and block downstream transport of sediment
- Affect accumulation and transport of toxic materials and other contaminants
- Affect suitability of water for human consumption
- Downstream flow variations during droughts may impact the assimilative capacity of streams during critical time periods
- Altering habitat due to water level fluctuations
- Changing riverine habitat to lacustrine habitat
- Entrain fish resulting in mortality (immediate and/or delayed) and injury or introduction of fish into unsuitable habitat

In general, dams change the mass and energy flow of rivers, affecting the morphology and ecology of the riverine environment.

II. STATE RULE GOVERNING PROCESSING OF APPLICATIONS FOR WATER QUALITY CERTIFICATION

The State of Wisconsin has adopted procedures for processing applications for water quality certification in NR 299.

A. PROCESS

The procedures for processing water quality certification are contained in Chapter NR 299, Wisconsin Administrative Code. Under these provisions, "all activities which require a federal license or permit which may result in any discharge to waters of the state" must receive a water quality certification. See NR 299.01, WI Adm. Code.

These water quality certification procedures have been adopted pursuant to Section 401 of the Clean Water Act (33 USC 1341) and Sections 144.025 and 147.01, Wis. Stats.

Any applicant for a Federal license or permit which may result in any discharge into waters of the state must make application to the Department for water quality certification. Any conditions we place in our certification become conditions on the license. If we deny water quality certification, the Federal agency cannot issue the permit or license.

The application process is contained in sub. NR 299.03, which outlines the general information that must be submitted to the Department. NR 299.03(2) provides that "the department shall review the application for completeness within 30 days and shall notify the applicant **of any additional information reasonably necessary to review the application.** "

The department has 60 days from "receipt of the complete application" to make its decision. (See NR 299.04 below) 18 CFR Section 4.38(f)(7)(ii) gives us one year to make our decision. If we have not received all necessary information within the one year deadline, we should deny the application without prejudice (prior to the deadline passing) to preserve our right to review the complete application and to attach appropriate conditions.

B. STANDARDS AND INFORMATION NEEDS

Review of applications for water quality certification must be done in accordance with NR 299, appropriate parts follow:

NR 299.04 Department review of water quality certification application.

(1) The department shall, within 60 business days of receipt of the complete application, determine whether it has reasonable assurance that the proposed activity will:

(a) Result in any discharge, and

(b) Comply with the following water quality standards:

3. Water quality standards adopted under s. 144.025 (2) (b), Stats., and 33 USC s. 1313;

6. Public interest and public rights standards, related to water quality, set forth in ss. 30.03, 30.10, 30.11, 30.12, 30.123, 30.13, 30.15, 30.18, 30.19, 30.195, 30.196, 30.20, 30.202, 30.206, 30.21, 31.02, 31.05, 31.06, 31.07, 31.08, 31.12, 31.13, 31.18, 31.23, 88.31 and ss. 144.025(2) (b), Stats. and made applicable by 33 USC s. 1341 (d);

7. Any other appropriate requirements of state law as provided in 33 USC s. 1341 (d).

Note: sections 1,2,4,&5 were eliminated as inappropriate for this purpose

C. PUBLIC NOTICE REQUIREMENTS AND HEARING RIGHTS

Under NR 299.05(4), there are requirements for public notices as follows:

(4) Except for applications under Chs. 30 and 31, Stats., the department shall, in the case of a grant or conditional grant of certification:

(a) Notify the applicant, the licensing or permitting agency and known interested persons of its decision.

(b) Cause notice of its decision to be published by the applicant as a class I notice under Ch. 985, Stats. Notice under this subsection shall identify the applicant and his or her address, describe the activity and its location, state the department's determination, and apprise the public of the opportunity to request a hearing under this chapter.

(5) Any person whose substantial interests may be affected by the department's determination may, within 30 days after publication of the notice, request in writing a contested case hearing on the matter under s. 227, Stats. In any case where a class I notice on the application is otherwise required by law or where a contested case hearing on an application for water quality certification will be held under some other specific provision of law, the notice and hearings shall be combined.

(6) Hearings requested under this section shall be contested case hearings, shall be in accordance with the procedures outlined in Ch. 227, Stats., and may not deal with issues that were adjudicated under separate authority. The hearing shall be a de novo hearing on the issue of whether the department should grant, grant with conditions, deny or waive water quality certification.

III. ISSUANCE OF CERTIFICATION IN FERC PROCESS

A. TIMING

Until the application is completed there typically isn't sufficient information to properly evaluate the project. FERC deems states to have waived 401 certification if no action is taken within ONE year of the request for certification. [18 CFR section 4.38(f)(7)(ii)]

Applications for water quality certification that come in before there is sufficient information should be denied without prejudice so that the Department preserves its right to make an appropriate certification decision after is sufficient information. Typically, there is sufficient information when the draft application is filed. Beware that often the requests for 401 certification are often buried within the text of the Initial Consultation Package, the Draft Application, or Final Application.

When a complete request for water quality certification is received, the Department must follow the shorter time requirements under NR 299 as follows:

*NR 299.03(2) The department shall review the application for completeness **within 30 days** of receipt of the application. The department shall notify the applicant of any additional information reasonably necessary to review the application. An application may not be considered complete until the requirements of the Wisconsin environmental policy act., s. 1.11, Stats., have been met and until all information necessary for associated permits, such as Wisconsin pollution discharge elimination permits under Ch. 147, Stats., has been submitted to the department.*

NR 299.03 (3) The applicant shall submit in timely fashion, at any time during the review process, such additional information which the department finds to be reasonably necessary for review of the application.

*NR 299.05 (1) The department shall notify the applicant, the federal permitting or licensing agency, and the regional administrator **within 120 days of receipt of the complete application** of its determination to deny the certification, grant or conditionally grant the certification, or waive certification.*

B . COORDINATION WITH 10j RECOMMENDATIONS

Any and all conditions that are to be included in a 401 certification should also be included in the recommendations made directly to FERC under parts 10a and 10j of the Federal Power Act. There may, however, be recommendations that will not legitimately be part of the 401 certification.

C. AUTHORITIES

When issuing conditions or denials (see part D), it is necessary to cite all applicable state authorities. The following list is a partial list of possible state authorities. In order to ensure statewide consistency, the FERC Coordinator must review 401 actions for FERC projects prior to the issuance of the certification in consultation with the Bureau of Legal Services. The project manager should plan accordingly to account for the additional review time.

1. Authorities which address issues of both water quality standards (designated uses and water chemistry criteria) and the public interest:

- NR102.04 Categories of Standards
 - (1) General
 - (2) Fish and Aquatic Life Uses
 - (4) Standards for Fish and Aquatic Life

NR 102.14 Taste and Odor Criteria

NR 103 Wetlands Water Quality Standards

NR 104.01 Intrastate Water Classifications
 NR 104.02 Surface Water Classifications and Effluent Limitations NR 105 Surface Water Quality
 Criteria for Toxic Substances

2. Authorities addressing public interest standards

Chapter 30 Navigable Waters, Harbors and Navigation

- 30.12 Structures and deposits in navigable waters prohibited; exceptions; penalty
 - 30.19 Enlargement and protection of waterways
 - 30.195 Changing of stream courses
 - 30.20 Removal of material from beds of navigable waters

Chapter 31 Regulation of Dams and Bridges Affecting Navigable Waters

- 31.02 Powers of Department
- 31.06 (Permitting Criteria)
 - 31.34 Flow of Water regulated

3. Miscellaneous appropriate authorities

There is a provision in the Clean Water Act for the inclusion of "other appropriate requirements of state law." In the past we have looked at issues such as Endangered Species, water quality needs, habitat, etc.

D. ITEMS TO BE CONSIDERED FOR INCLUSION IN CERTIFICATION

The conditions included in the water quality certification must be tied to water quality or the designated uses outlined in the water quality rules. FERC has taken the position that it will make the decision of whether water quality certification conditions were appropriately included in the certification when issuing the license.

The Wisconsin Supreme Court, in numerous decisions interpreting the "public trust doctrine" relative to Wisconsin's navigable waters, has broadly construed "public rights" and "public interest" as those terms are used in Chapters 30 and 31, Stats. In the 1930's, the Supreme Court held that the public has the rights to use our navigable waters for "sailing, rowing, canoeing, bathing, fishing, hunting, skating and other public purposes." See Nekoosa Edwards Paper Company v. Railroad Commission (1930). In 1969, The Supreme Court held that the public had a "right to clean, unpolluted water" and that the State of Wisconsin had to consider impacts on water quality before issuing permits. See Reuter v. DNR (1969). There have been numerous decisions in the courts since 1969 recognizing the importance of protecting water quality and our water resources. When we are making water quality certification determinations, we must consider the

breadth of these decisions.

Items that should be considered for inclusion in a 401 Certification in order to protect public rights and public uses include, but are not limited to:

1. Flow limitations: including
 - run-of-river operations; one possible definition is instantaneous inflow = instantaneous outflow
 - minimum flows; either instantaneous or average daily
 - minimizing daily variation between minimum and peak generation flows
 - ramping rates
 - gauging and maintenance of monitoring of minimum flows
 - maintenance of side channel flows

The conditions should deal with any of the standards outlined above, including dissolved oxygen, temperature, public rights, and public interest standards. Compliance conditions should be considered when the 401 certification conditions are being created. The compliance standards and definitions should be included in the 401 certification.

2. Maximum and minimum water levels in the pool

Different levels may be specified for different times of year and amount of allowable fluctuations may change over different time scales (i.e., daily, monthly, annually) Levels are often tied to D.O., nutrient levels, erosion problems, fish and wildlife habitat and navigation. Different levels may also be appropriate during periods of low flow.

3. Conditions to protect public rights and public uses related to water quality and quantity downstream of a project (including considerations such as dissolved oxygen, temperature control, fish and wildlife habitat and navigation).

Items for potential inclusion: spillway flows, aerators, turbine venting

4. Maintenance and restoration of fish and aquatic life habitat

Physical alterations of habitat or channel morphology to maintain or restore existing fish and aquatic life habitat and designated uses.

Items for potential inclusion: fish cribs; aquatic macrophyte plantings; fish crib installation; removal of obstructions which cause fish stranding

5. Erosion control

Actions in accordance with 30.19 and public trust statutes. Use of BMP's to minimize erosion into waterways and to assure there is no environmental pollution as defined in 144.01(3).

6. Low flow operations

Means to maintain water quality standards, especially temperature, D.O., pH, and toxic standards during periods of low flow and reduce habitat losses due to dewatering. Low flow operations can have dramatic impacts on assimilative capacity. Variations in flows

during drought conditions can increase amount of time when flows are below needs of wasteload allocation and increase the severity of the problem. In addition, the maximum and minimum operating elevations for the reservoir may need to be modified. If the levels and conditions under which they'll be invoked can be determined in advance, they can also be included.

7. Protection of "*designated uses*" identified in the water quality standards

The stream classification of rivers with dams is generally warmwater sports fishery. In rare cases, drinking water standards may apply.

8. Fish Passage and Protection

Protection includes items such as exclusion from entering the turbines and downstream passage (safe bypass of the turbines). Attractant and bypass flows should be considered as part of any condition for fish passage.

9. Seasonal Variations in Operations

Changes in operations (such as minimum flows, water levels, etc...) to reflect the needs of fish and aquatic life at different phases of the annual life cycle. Higher minimum flows during spawning season would be one example.

10. Cumulative Impacts

Impacts attributable to the construction, operation, or existence of hydropower projects which may occur, based upon past or reasonably anticipated impacts of similar projects should be considered. In addition, the geographical shifting of impacts due to the specifics of the situation should also be considered, such as when a peaking project discharges into the pond of another project so the effects of peaking aren't realized until downstream of the second project.

E. INTERSTATE WATERS

On interstate waters, the Clean Water Act section 401(a)(1) specifically says that the state in which the discharge originates has the authority for 401 certification. Under section 401(a)(2), the federal licensing agency is supposed to notify EPA of the interstate water quality certification action. EPA in turn, may decide to notify other states affected by the discharge and certification action. If the other state(s) wish they may then request a hearing, before the licensing agency, to raise their water quality concerns at which EPA makes a presentation.

IV. ACTIONS AVAILABLE AND CONDITIONS FOR USE

1. Certification

If the proposed project is acceptable, then the water quality certification is issued to certify the project is in compliance with appropriate state water quality regulations.

NR299.05(3)(d) contains the language associated with granting certification or conditional certification:

(d) *A grant or conditional grant of certification shall include:*

1. *A statement that there is a reasonable assurance the activity will be conducted in a manner which will comply with the standards enumerated in s. NR 299.04 and, if appropriate,*
2. *A statement of conditions which the department deems necessary with respect to the discharge including necessary monitoring requirements. Monitoring requirements shall include, but not be limited to, provisions that:*
 - a. *At least 5 business days prior to the beginning of the discharge, the applicant shall notify the department of its intent to commence the discharge;*
 - b. *Within 5 business days after the completion of the discharge, the applicant shall notify the department of the completion;*
 - c. *The applicant shall allow the department reasonable entry and access to the discharge site in order to inspect the discharge for compliance with the certification and applicable laws.*
3. *A statement advising the licensing or permitting agency and the applicant if the activity proposed may require additional authorization under requirements of state law administered by the department which are not related to water quality.*

2. Conditional certification

All conditions contained in a water quality certification must be included in a FERC license if they are related to water quality.

See Section 1 above for details covering granting conditional certification.

3. Denial without prejudice

When a request for water quality certification is received before the draft application or when there is insufficient data to evaluate the request (whichever is later), the request should be denied without prejudice. This action preserves our authority and does not pass judgement on the merits of the project. The applicant can reapply at a later date when the necessary information is compiled.

4. Denial

Denial of water quality certification carries special weight in the FERC hydropower licensing process. No license or exemption can be issued by FERC if the state has denied water quality certification.

Denial of water quality certification is made in accordance with NR 299.05(3)(e) as follows:

- (e) *A denial of certification shall include, a statement explaining why the department does not have reasonable assurance that the discharge will comply with the standards enumerated in s. NR 299.04, and detailing the standards of concern.*

5. Waiver

The Department can waive water quality certification by formally issuing a waiver of certification (as done in the past) or failing to act on the certification within one year of the request [18 CFR section 4.38(f)(7)(ii)].
Generally waivers should not be issued.

Waivers are made in accordance with the procedures outlined in NR299.05(3)(c) as follows:

(c) *A waiver of certification shall include:*

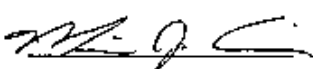
1. *A statement explaining the determination that no discharge will result from the activity or that the activity does not fall within the purview of the department's authority; and*
2. *A statement advising the licensing or permitting agency and the applicant if the activity proposed requires authorization under requirements of state law administered by the department which are not related to water quality, and, where applicable,*
3. *Specific recommendations to the federal permitting authority and the applicant for avoidance of waters of the state. When all reasonable alternatives necessarily result in adverse impacts on waters of the state, a waiver may recommend specific project locations, and design and construction techniques which minimize adverse impacts on waters of the state and which minimize overall environmental impacts.*

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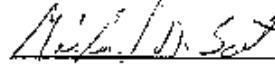
Michael Cain - LC/5



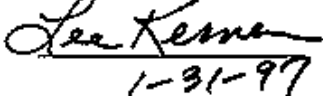
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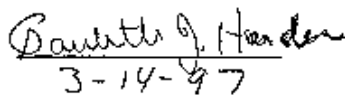
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3-14-97